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Editorials

THE MEDICAL PROFESSION WILL CONTINUE TO GIVE THE BEST POSSIBLE MEDICAL SERVICE

In these times of uncertainty, when worlds are being made, unmade and remade with abandon, when the world is being worried by every form of vexations, and physicians are beset by the difficulties of economic change, when hazards of every kind surround the physician on every side, the medical profession re-affirms its faith in the future of medicine, its technical excellence, its high ethical standards, and stands ready to meet every up-to-date need of twentieth century civilization.

HAPPY NEW YEAR, 1939!

The medical profession in the United States starts off the new year with the 1939 model of the famous wooden horse that kicked over the town of ancient Troy, not *at* the gates, but actually *within* them.

We *may* have a new Parnassus established down on the banks of the Potomac, and a fresh set of Olympians dripping with human follies, but it is well for us to remember that neither Zeus, nor Hera, nor the goddess of wisdom, herself, the great Pallas Athene, interfered to save the walls of Ilium, when the horse, with its stomach filled with enemy warriors was once *within the fortifications.*

For three decades now, the editor of this magazine, and those whose ideas have been analogous to his, have preached against the wooden horse. We have all preached so strenuously, that in the minds of many of our brothers, the bogey that we talked of, tax supported medical practice, or "Public Health Insurance," became only our personal hobby-horse. Too many of the doctors let us talk on—without listening to us—as to what would happen to scientific medicine if the sneered-at, the mocked and so-called "hobby-horse" ever got on the inside track of the medical profession and took to rocking and careening.

And now that this situation has come to pass, every honest doctor in the United States, whether he admits it openly or not, is realizing that great matters stand all askew.

Tax supported medical practice to the average layman is as tempting a morsel as was the strategic wooden horse that accomplished the fall of Troy or Ilium. It is the cat's paw with which the communistic foes of America and American democracy plan to pull the chestnuts out of the fire. But that the layman does not know.

Quoting from Bullfinch's "Age of Fable" in his abridged tale of great Homer's Iliad we read in part:

"But Troy still held out, and the Greeks began to ever despair of subduing it by force, and by advice of Ulysses resolved to resort to stratagem. They pretended to be making preparations to abandon the siege, and so a portion of the ships were withdrawn and lay hid behind a neighboring island. The Greeks then constructed an immense *wooden horse,* which they gave out was intended as a propitiatory offering to Minerva, but in fact was filled with armed men. The remaining Greeks then betook themselves to their ships and sailed away, as if for a final departure. The Trojans, seeing the encampment broken up and the fleet gone, concluded the enemy to have abandoned the siege. The gates were thrown open, and the whole population issued forth, rejoicing at the long-prohibited liberty of passing freely over the scene of the late encampment. The great *horse* was the chief object of curiosity. All wondered what it could be for. Some recommended to take it into the city as a trophy; *others felt afraid of it.*"

Yes, *"others felt afraid of it."* That is what discerning medical men have felt about tax supported medical practice. The sixth sense that helps the skilled physician to accurate diagnosis of physical or mental conditions has made such physicians timorous in the face of the "wooden horse" of communism. But getting back to Bullfinch:

"While they hesitate, Laocoon, the priest of Neptune, exclaims:

" 'What madness, citizens, is this? Have you not learned enough of Grecian fraud to be on your guard against it? For my part, I *fear the Greeks, even when they offer gifts.*' So saying he threw his lance at the horse's side. It struck, and a hollow sound reverberated like a groan. Then perhaps the people might have taken his advice and destroyed the fatal horse and all its contents; but just at that moment a group of people appeared, dragging forward one who seemed a prisoner, and a Greek. The chiefs reassured him, promised the man that his life would be spared if he told them the truth. He said he was a Greek, by name, Sinon, who had been left behind, and that the horse was a propitiatory offering to Minerva and made so huge for the express purpose of preventing its being carried into the city, for Calchas, the prophet, had told them that if the Trojans took possession of it that they would assuredly triumph over the Greeks. These words turned the tide of the people's feelings and they began to think how they might best secure the monstrous horse and the favorable auguries connected with it, when suddenly a prodigy appeared which left no room for doubt. Two immense serpents came over the sea . . . they attacked the dissenting Laocoon and his two sons and strangled them in their poisonous folds. . . . This event was regarded as a clear indication of the displeasure of the gods at Laocoon's irreverent treatment of the wooden horse which the people no longer hesitated to regard as a sacred object and prepared to introduce with due solemnity into the city which was done with songs and triumphal acclamations, and the day closed with festivity. In the night the armed men who were enclosed in the body of the horse were let out by the traitor Sinon, and they opened the gates to their friends who had returned under cover of the night. The city of Troy was set on fire; the citizens, overcome with feasting and sleep, put to the sword and Troy completely subdued."

The analogy is sufficiently plain. No explanations are needed. We have in the presence of the communistic wooden horse fifty Sinons to every Laocoon and the Sinons prevail.

The wooden horse is within our gates. That is true. But there is still time to save ourselves. If the warriors had been kept enclosed within the animal and the counsels of Laocoon had prevailed "tall Troy's towers" might yet endure.

The lesson is poignant. One paw of the horse sits now in the District of Columbia, and there

is yet another in the Dakotas that are not vital ballasts in the nation's ballot, and a third in the State of California, that is. Quoting Swift:

"Laocoon struck the outside with a spear,
And each imprisoned champion quaked with fear."

Let every honest physician in the land ally himself with the principles of Laocoon. Strike with the spear of intelligent education of the laity, and with the force of the ballot allied to organized medicine for the sake of science and humanity.

Then indeed will 1939 be a "Happy New Year" because a year triumphant for principle and right and adherence to the Hippocratic Oath. The hour is long past when any self-respecting physician dare, like the homebound Greeks leaving Troy, even so much as nibble at the lotus food of undue optimism and forgetful of this national and scientific and humanitarian crisis follow the course of the lotus eaters who found—

"How sweet it were, hearing the downward stream
With half-shut eyes ever to seem
Falling asleep in a half dream . . .
Eating the Lotus, day by day!"

ACTION AGAINST THE A. M. A. OPENS VAST FIELD OF MENACING POSSIBILITIES

Heresy trials of the Middle Ages come to mind in the latest attack on organized, scientific medicine that brought to the hearts of the New Dealers that gratification that it seems can be supplied them only through newspaper headlines. At least a capacity for sensationalism and its begetting must be ceded them. For the A. M. A. seems to be on trial!

History holds no recorded annals of the persecution of "medicine men" who ably performed their jobs. It is interesting to note that the American Medical Association is not on trial for inefficiency, nor negligence, nor for lack of progression.

Then *why* is medicine on trial instead of the cobbler, or the tailor?

From the looks of things medicine is on trial and under indictment because it is not allied with boosting the communistic groups bent and determined upon undermining the entire structure of the United States and putting it in the same condition as that decadent Europe from whose ruined splendor these ideas of destruction are imbibed. The New Deal is going to socialize medicine because the New Deal is socialism riding in a gold-plated wagon as socialism has never ridden before. Quite aside from medical care and other social aspects the Government's indictment against the American Medical Association and several individuals is of direct importance to trade unionists, professional men, and serves businesses general.

In the case of the doctor, it should be realized he has nothing to sell but his services. He may leave medicines with the patient or order a prescription filled at the nearest drug store, but this bit of merchandising, is purely incidental to his visit. His real mission is to use such skill and knowledge as he may possess to make a sick patient well.

In spite of this interpretation, namely, that the doctor gives services and not merchandise the Department of Justice indicts the American Medical Association and several individuals and affiliates as a monopoly of services.

Therefore, in proceeding against the A.M.A. as a monopoly of services, the Department of Justice has opened a vast new field of anti-trust activity that is tremendous in its scope. Immediately certain parallel possibilities suggest themselves.

If the federal indictment of action against a purely service organization be followed by convictions, are the dentists, nurses, pharmacists, barbers, grocers, milk dealers, dry cleaners, newspaper service deliveries and other service trades as immune from price fixing prosecutions as we have heretofore been led to believe.

If hospitals can be prosecuted for refusing to accept patients of a cut-rate "nonunion" medical clinic, can the plumbers, carpenters, fixture hangers or similar unions be punished for refusal of their services in installing nonunion materials on a building job?

Or if social aspects justify the intervention of the government in behalf of low-priced medical care for the masses, can the same argument be used to crack down on net of make-work rules that help to keep building costs high?

The hospital, likewise, is primarily a service organization. The patient within its walls buys no merchandise; he pays his money for labora-

tory tests, operating facilities, and such nursing and other care as is necessary to make him a physically fit member of society again. If he dies, his estate is presented with a bill on a basis of services rendered rather than for merchandise purchased.

If the A.M.A. can be convicted as supporting a monopoly of services the situation becomes of tremendous importance also to all professions.

Are the banking groups immune from federal or state action if they prescribe or urge uniform service fees for small accounts or other bank activities?

Can the American Bar Association or a state bar association lawfully suggest schedules of fees to be charged by their members?

Can any professional organization, be it composed of lawyers, doctors, dentists or real estate operators, engage in promotional activities that may lead to monopoly in any particular field?

Finally, the government case against the American Medical Association affiliates and individuals has been taken out of the controversial stage and reduced to cold legal phraseology of indictments; there will be an appeal to the lower court for decisions and to the United States Supreme Court for a final ruling.

In a radio talk on August 15, 1938, President Roosevelt said: "A national health conference was held at my suggestion to consider ways and means of extending to the people of this country more adequate health and medical services."

Health laws and plans are to be introduced in this Congress.

As a part of the propaganda carried on ever since the Committee on the Costs of Medical Care published its subsidized report in 1932, a carefully supervised and adroitly planned campaign has emanated from Washington aimed at the socialization of medicine.

A committee in Washington is urging the spending of $850,000,000 a year for ten years in a program of Government public health activities. If the profession can help control the spending of this sum, a great deal of it will be properly used and if the doctors will stick together, their voice cannot be ignored.

But the question is now, Will the doctors organize themselves and stick by their organizations one hundred per cent? In union there is strength.

THE DOCTOR'S BILL, THE VIEWPOINT OF A LAYMAN

Indictment of the American Medical Association by government authorities reminded us of the ancient custom of whipping the sea with the classic edition of a ranchero's or mule-driver's black snake.

Apt comment on this government "bull" finds the apotheosis of excellent perspective in the editorial appearing in the *Chicago Daily Tribune* under date of December 31, 1939, reproduced herewith by special permission:

THE DOCTOR'S BILL

"The indictment of the American Medical Association and some of its directing officials was not a courageous act in the sense that the administration is likely to lose great numbers of votes as a result of its action. The probabilities, unfortunately, are all the other way.

"The doctor is welcome when there is illness in the family but the memory of his bill often outlasts gratitude for his services. Circumstances makes it easy to think of the doctor as a profiteer on misfortune. When everybody else sends flowers the doctor sends a bill. All too frequently it arrives when the family is hard pressed because of loss of income resulting from the illness itself and because drugs, nursing, hospital care, and special diets have imposed unexpected burdens upon the family budget.

"Illness itself inspires in the victim and his family a sense of injustice. He didn't ask for an inflamed appendix or an invasion of pneumonia germs. It was his hard luck to fall victim and it seems to add to the injustice to make him pay in money as well as in suffering. Worse still, the more serious the disease and the greater the suffering the heavier the bills are likely to be.

"Accordingly, many citizens would welcome state medicine or socialized medicine. The medical association has resisted that trend with all the vigor at its command. The doctors believe that if they had to look to government for their support the quality of medical service and the competence of the profession would decline rapidly. There is much evidence to support this view and little to refute it. Any one who had contact with the medical corps in the war knows how wide was the gulf which separated the regular army doctors from the physicians who en-

listed from private practice. There were exceptions on both sides, but it was clear that the standards of professional competence as of professional conscience were far higher among the volunteers than among the regulars. It was no accident that Jimmy Roosevelt in his recent illness preferred the Mayo clinic to the government hospitals to which he could have been admittted at small cost either as a high-ranking civil employe of the government or as an officer of marines.

"The doctors may be wrong in seeing a trend toward state medicine in a number of recent innovations in medical economics but it would be astonishing, indeed, if the profession were not in a suspicious frame of mind. The present administration in Washington is eager for new fields of activity to dominate. It has given numerous evidences of its desire to include medical service within its grand scheme of social security. If that happens, the relations of doctor and patient will be radically altered and the overwhelming probability is that the change will be to the disadvantage of both.

"Whatever the faults of the present organization of medicine may be, the fact is that disease and death rates have dropped to the lowest point in the history of this country. Medical science has made phenomenal progress, thanks in no small part to the activity of the medical association in forcing higher standards upon medical schools and hospitals, and in publishing scientific journals. It may well be true, as is often said, that the medical requirements of the family of moderate means (in contrast to the poor and the prosperous) are not fully met by present arrangements but the case has been greatly exaggerated. Families of moderate means constitute the largest single element in the population and if their needs were not being met pretty satisfactorily the death and disease rates would be rising, not falling.

"The doctors have recently proposed a plan which deserves sympathetic study. They suggest that the risk of illness among persons of small income be covered by insurance with an annual premium which would not place an undue strain on the ordinary family's budget and would cover ordinary risks. The person (or family) so insured would receive, in case of illness, a cash payment sufficient to meet the reasonable costs of treating the disease contracted. The patient would still be free to choose his own doctor. It is thought that the obvious weakness in such a plan, the likelihood that some patients would take advantage of it to malinger and others would be encouraged in malingering by unscrupulous physicians, could be overcome by giving supervision of the plan to the medical societies. The proposal is intended to cover the cost of medical services much as the Plan for Hospital Care covers hospital charges.

"Obviously the adoption of such a plan would not solve the last budgetary difficulty created by disease, nor would the plan revolutionize medical practice. Those who believe in state medicine will, therefore, reject the proposal out of hand. Others who have the wit to see that under present arrangements miraculous advances have been made in medical science and in distributing the benefits widely will hope that under this plan or some other the unavoidable costs of illness can be made less burdensome to the patient without at the same time destroying the professional pride and ambition of the physician.

"In spite of the fact that its material rewards are not great, medicine today attracts and holds superior young men and women; it would not do so if they felt that their future depended on governmental favor rather than upon professional attainments. Experience teaches that there is far more reason to place confidence in the high purposes and altruism of the doctors than in the tall talk of politicians or the wishful thinking of professional reformers."

MEDICINE CANNOT ESCAPE BEING DRAWN UP BY THE WHIRLWIND

Merle Thorpe in *Nation's Business* for December, 1938, under the title "For 1939—No Red Herrings," says:

"Comes now the New Year with its traditional sound effects. Many high and noble resolutions to turn over a new leaf will be the order of the day.

"Our resolve is to continue the thankless role of 'His Majesty's Loyal Opposition,' and, as such, to wish for the nation fewer political red herrings across the trail in 1939.

"Nine long years have rolled by and commissions, surveys, investigations continue solemnly and pedantically to take our business mechanism apart for microscopic study of each wheel, bar,

escapement. Each part is publicly indicted for its failure to provide jobs, production, security.

"These monotonous charges are red herrings to distract the public's attention from the real defendant. Private enterprise has been supplanted these nine years by National Planning and Management. Political management should be in the witness box under cross-examination. It should also be at the bar as defendant.

"Political Planning in the driver's seat has distributed the nation's savings—not private enterprise. Politics has allocated billions of formerly free capital to its purposes, and also 20 billions of the credit stored up in pre-planning days. When such learned savants as Lubin and Henderson and Jerome Frank plaintively deplore the lack of capital investment, they should face the real culprit, the political control and operation of 24 federal lending boards.

"For ten years politics has 'planned' extensively and intensively for agriculture with two billions of dollars and unlimited power. Our investigating commissions would find wheat today at the lowest price in terms of gold in 300 years, world markets disrupted, government granaries bulging, and should, in an honest search for truth, cross-examine the administrators of National Planning in the farm field.

"Likewise, since the job of labor relations has been taken from private management and lodged with federal administrators, they, not private enterprise, should be put on the grill. Why, they should be asked, are such relations—once the envy of foreign competitors—today torn and hate-engendered, a class-consciousness hitherto unknown, the one-time production through the joy of breaking records faltering and uncertain?

"In sum, those responsible for planning the free markets of grain and securities, housing construction, in producing kilowatts and expansions of the service, supervision of coal, oil, and rails, to mention only a few of the myriad new controls, should bear the burden of proof for failure to make good on promises. To arraign private enterprise again is a herring of deepest red.

"Patriotism calls upon statesmen to stand up and answer, to be the first to admit mistakes! What have the sponsors of the new controls to say about the failure of their promises? What have we after nearly ten years of political planning in the business field? Unemployment still in eight figures. Industrial activity at the level of 1917. A 'relief' class, to be permanent, confesses Mr. Hopkins. A liberalism, once vigilant against political control over individual lives, now perverted to mask a campaign for greater political power. A class-consciousness of the Old World pattern. Yardsticks discredited. The nation's savings expropriated and dissipated. Youth, admonished by the Youth Administrator 'to hold the social and economic gains.' What gains? A corroding self-help, a dependence upon the national till, which, in reality, is spending youth's own future earnings. Thrift a mockery. The spectacle of 'democracy eating itself up.' Millions added to tax pay rolls, living lives of political overseers, enjoying a standard of living to which they were never accustomed. The spectre of inflation or repudiation.

"In broad strokes, there is the picture of our experiment of substituting for the old-time American way an adaptation of imported ideas—which glorify political authority at the price of the people's liberty—ideas which assure the growth of authoritariansim while the people languish in the frustration of their wills and energies.

"If the forgotten 40,000,000 who have patiently and resourcefully kept at work during these years of daily alarums of new regulations could articulate, they would join in the New Year's resolution, 'Yes, we want no red herrings in 1939.'"

ECONOMY IN MEDICATION

By economy in medication Bernard Fantus, Chicago (*Journal A. M. A.*, March 19, 1938), does not mean the use of inferior remedies, for the first principle of economy in prescribing is that the most efficient remedy is likely to be the cheapest. The second principle in the economy of medication should be: Among drugs of equal efficiency, choose the least expensive. What this might mean in the case of hypnotics and analgesics is illustrated by tables. Two of the three most efficient hypnotics, namely, chloral hydrate and barbital, are also the cheapest. In such large institutions as the Cook County Hospital, the saving resulting from cooperation between the prescribing physician and the dispensing pharmacist might easily run into huge sums. Even in private practice it pays to economize in medication. Some physicians are nothing less than spendthrifts and wasters when it comes to prescribing. Economies can be practiced in the preparation of hypnotics, analgesics, disinfectants, placebos and in the drug room. These are discussed separately.

MEDICAL ECONOMICS

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The indictment of some of the officers of the American Medical Association and the Medical Society of the District of Columbia in the Federal Court is undoubtedly the most important medical economic development of the month. Regardless of the final outcome of the suit, the indictment has focused the attention of the newspaper reading public on the medical profession and has prepared the soil for further propaganda in the near future when the Congress meets. Every medical Journal coming to the desk of the writer gives some new light on either the methods used by the Interdepartmental Committee in the past or the ideas and opinion of some observer as to what is being planned at Washington for the medical profession in the coming Congress.

We would suggest that every member of the profession read two articles in the current number of the *Medical Economics,* for December. The first is found on Page 35 and is an editorial by H. Sheridan Baketel entitled "Our Political Line-up." This presents the idea of the Chairman of this Committee much more clearly and briefly than he is able to, and should make every member of the Illinois State Medical Society do some real thinking. We must face the facts and try to figure out the proper treatment of the affection. The second is found on Page 49, and is entitled "The Committee of Seven Goes Begging." Many of us have felt for some time that the medical profession has been "pushed around" a little to use the common term. There can be no argument that we have been ignored and the planning at Washington has been in the hands of non-medical folk. At times it has seemed that the medical profession was being deliberately placed in a compromising position and made to look bad. This article by a layman, Patrick O'Sheel, presents the best account of what was done and what was not done at the Conference of the Committee of Seven from the American Medical Association and the President's Interdepartmental Committee to come to the attention of the writer. Many facts are presented, and we must accept them as facts, which have been hinted at before, but not definitely stated. If all the facts are as presented, it seems that the conference between these two groups might just as well not been held as far as convincing either side that the other has a just reason for a difference of opinion. In a country such as this such an attitude is indefensible. It makes just such action as the Editor suggests in the editorial above referred to the more necessary and urgent. Now if your patience is not exhausted turn to page 31 and read the article entitled "The F.S.A. Adopts a Half Million Patients." Follow this with exhaustive article on Page 23 of the *Saturday Evening Post* of December 17 by Samuel Lubell and Walter Everett on "Rehearsal for State Medicine." Then if you are not convinced that the boring from within has been and is being carried out successfully by governmental employees, there is no hope of convincing you that there is any danger confronting the medical profession at this time. We wish to quote particularly the closing paragraph of this article for your careful thought. "If this review of a rehearsal seems to have raised more questions than it has answered, let that be the moral of the story." That expresses the underlying ambition of the writer of this column for the past four years. If we can just get the medical profession to believe that dangers are imminent to the future of the practice of medicine and that there is still time to do something and this something must be done by the entire profession getting together and forgetting political parties and petty jealousies then all the effort expended has not been in vain.

Newspapers report that the California Medical Associations have adopted a plan for fur-

nishing Medical and Hospital care to citizens in certain salary groups on a prepayment basis of a certain sum each month. Although this subject has been presented in a limited degree in the official *Journal of the California State Medical Association, California and Western Medicine,* it seems unfair to discuss or criticise the plan until it has been officially presented in detail. Certainly we are correct in saying at this time, that this is a revolutionary step, which will be noted with great interest all over the United States by the medical profession in particular as well as the laity. Whether it is well timed for the future of medicine is a matter of opinion and time alone can properly evaluate that. The plan has been enthusiastically received by the press of California, and now that it has been officially adopted it is to be hoped that it will have a fair trial and that the medical profession will continue in complete control of the entire plan during this trial period.

Recently, in the December issue, *The Commentator* made some very general statements as to what could be done in the United States to save life and diminish sickness. According to their calculations both morbidity and mortality could be greatly reduced by proper adequate medical care. NO statement was made as to the source of their information and while no severe criticism of the medical profession was made, the intimation was clear that the present system of furnishing medical care was very inefficient. This type of article which apparently was used as a filler on one of the pages where an article was completed without using all the space, seems manifestly unfair to the medical profession. Practically every magazine coming to our attention carries an article on medical care. The majority are not too kind to the medical profession. Apparently, the propaganda mill is against the medical profession.

The Federal Security Administration, formerly called the Farm Resettlement Administration, is back at work in Illinois, trying to get the Illinois State Medical Society to sponsor medical care for their clients at reduced prices after the plan in used in the Dakotas and described in the articles above referred to. Members of the Council are being contacted individually and the merits of the plan ably presented by excellent salesmen. You will recall that an attempt was made early in 1937 to get the endorsement of the Illinois State Medical Society by the Dr. Williams referred to in these articles, but the Council was unable at that time to see either the need or advisability of adopting such a plan in Illinois. It scarcely seems possible that any further need for the same could have developed since that time for we have had excellent crops the past two years and the A.A.A. has ladled out assistance to farmers so lavishly that, even the clients of the F.S.A. should be able to pay their doctor bills without the help of the government. We understand that the F.S.A. is making a survey of the medical needs of their clients for the past two years to determine the need of the adoption of some plan for more adequate care at reduced prices. It is the old story of more for less. Action on this question may come up at the next meeting of the Council at Rockford on January 8, 1939.

The report of the Governor's Committee on State Maternal Welfare will present both a report and a recommendation for the improvement and regulation of the obstetrical departments of hospitals in the state of Illinois. Some of these are advisable, but some of those presented seem to be entirely too drastic for many of the smaller hospitals in Illinois. It is to be hoped that the Council will give the report serious consideration and not adopt anything which will handicap the hospital or physicians of the state in conducting the practice of medicine in the obstetrical field.

The Committee extends to every member of the Illinois State Medical Society the compliments of the season and hopes many of the economic problems now facing the profession will be solved to the benefit of both the laity and the medical profession.

E. S. Hamilton,
Chairman, Committee on Medical Economics.

FULL CITIZENSHIP REQUIREMENT FOR LICENSURE

The House of Delegates of the American Medical Association at the San Francisco meeting approved a resolution to be submitted to the Federation of State Medical Boards and to the officers of each examining board of the United States with the request to consider seriously the urgent need for adoption of such rules and for

legislation necessary for the additional licensure requirement of full citizenship of foreign medical graduates.

It is hoped that all state boards will give this important matter serious consideration and advise the Federation office of any action taken so as to guide the Federation in preparing for the official consideration at the next annual session in February, 1939.

The resolution states in full:

WHEREAS, The license to practice medicine and surgery in many countries is limited strictly to citizens of these countries; and

WHEREAS, In addition to holding full citizenship, each applicant is required in several of these countries to show that his medical education was pursued and completed in said countries; and

WHEREAS, Many foreign graduates in medicine and surgery in increasing numbers are seeking admittance to the practice of medicine in these United States; and

WHEREAS, In order to convey adequately to these applicants a full and satisfactory knowledge of the American conception of patriotism and of ethical ideals in medicine, it is necessary that a period of residence be required; therefore be it

Resolved, That in addition to the requirements for foreign graduates, as outlined in a resolution adopted by the House of Delegates for the American Medical Association in 1936, it is highly desirable that an additional requirement of full citizenship in the United States of America be demanded; and be it further

Resolved, That the House of Delegates of the American Medical Association approve the foregoing and that a copy be sent to the properly constituted officers of each examining board of the United States and to the Federation of State Medical Boards, with the request that they consider seriously urgent need for the adoption of such rules and/or legislation necessary to put the purpose of these resolutions into effect.

TULAREMIA IS PREVALENT OVER THE UNITED STATES

A press service release December 23, from the United States Public Health Service speaks of the Tularemia situation. We quote:

With reports for November and December, the two months of greatest prevalence, not yet available, a total of 613 cases of tularemia has been recorded to date in 1938. This figure does not include cases occurring in Illinois, Ohio, Virginia, and Kentucky, where, for the past twelve years, the highest incidence has been reported.

"While tularemia does not represent a major health problem," says Medical Director, United States Public Health Service, "nevertheless, the fact that so much distress and mortality could have been avoided by reasonable precautions, renders the subject more interesting than the numbers imply. There had been 8,000 cases with 396 deaths reported up to 1938."

It would seem that sufficient warning had been given by the Service and other public health agencies, "so that the average citizen might be informed of the dangers offered by wild rabbits and some other animals.

"Yet cases of tularemia continue to occur in progressively greater numbers each year in which, apparently no precautions have been taken. This is an excellent illustration of the cultural lag which occurs between the acquisition of valuable knowledge by scientists and its practical application by populations."

Discovered in 1910, named in 1920, and elucidated from beginning to end by Public Health Service investigators, human cases of tularemia have been recognized everywhere in this country except Connecticut and Vermont. In the decade after 1925, it was variously reported in Japan, Russia, Norway, Sweden, and Austria.

An acute infectious disease caused by the *Bacterium tularense* (after Tulare county, California, where first found), it occurs under natural conditions in over twenty kinds of wildlife, with cottontail, snowshoe, and jack rabbits the chief reservoirs and direct causes of over 90 per cent of the human cases in this country. Man becomes infected by contact of his bare hands with the raw flesh and blood of these animals, or by bites of blood-sucking ticks and flies which have previously fed on infected animals.

Hunters, market men, cooks, and housewives become infected when skinning or dressing wild rabbits. Their bare hands may become covered with blood when they pull out the livers and spleens. If by chance there is an open sore or cut on the hands, the infection may enter the wound on the hand and cause the disease. When a rabbit is shot, its bones often become shattered into sharp fragments. If, in dressing an infected rabbit, one of these fragments of bone pierces the skin of the hands, the infection may enter at that point.

About three days after exposure to such a wound infection, illness begins with headache, chilliness, vomiting, aching pains, and fever. The patient may think that he has influenza and

go to bed. The sore on the hand, or elsewhere, develops into an ulcer. The glands at the elbow or in the armpit become enlarged, tender, and painful, and later may develop into an abscess. There is sweating, loss of weight, and debility. The illness lasts ordinarily about three weeks, and is followed by a slow convalescence which may extend two or three months. Most patients recover without any bad after effects, but about 5 per cent die, especially if the case is complicated by pneumonia.

One who has recovered from an attack of tularemia need not fear a second attack, because he is then immune to the disease. There is no record of a second attack in man. There is only one record of the transfer of the infection from man to man. Doctors, nurses and attendants caring for the sick have not contracted the disease.

Tularemia has no seasonal prevalence except as it is influenced by insects or by contacts with infected animals. Laboratory infections may occur at any time. Human cases are more prevalent in summer time in the western states where ticks and deer flies are the cause of infection. Human cases, due to infection from dissecting jack rabbits, are likewise most prevalent during April to October, because these are the month of greatest destruction of these pests. East of the Mississippi, cottontail rabbits are responsible for most human cases, and since they are generally protected by law except during a few winter months, the seasonal prevalence is apt to be November to January, when the hunting season is on.

Rabbits raised under domestic conditions and sold for food or for pets, have never been found naturally infected. They are just as susceptible to artificial inoculation in the laboratory, however, as are the wild rabbits.

The prevention of tularemia is almost entirely a matter of personal precaution. No curative or preventive serum has been perfected. Sick or dead wild animals which are found should not be handled; forget about the rabbit which you can stalk on foot and knock over with a stick. Any carcasses in which peculiar whitish spots are found on both liver and spleen should be discarded and buried or burned.

Keep the bare hands out of a wild rabbit. The bacillus of tularemia does not require a wound for its entry, but can go through the healthy skin. Sometimes infection is contracted by rubbing the eyes with soiled fingers.

Rubber gloves afford reasonable protection to those who must dress wild rabbits and other animals, but sharp fragments of rabbit bone can easily pierce a rubber glove and puncture the hand. Employ immune persons when contact with infected material is necessary.

Thorough cooking of all wild game, especially rabbits, is essential. Infected meat is rendered harmless for food by thorough cooking, but if any red juice is allowed to remain about the bones, the germs will remain alive and virulent.

The liberal use of soap and water and disinfection of the hands are recommended to remove rabbit blood from the hands, or even when the hands have come in contact with the rabbit's fur.

EDUCATIONAL COMMITTEE REPORT FOR NOVEMBER AND DECEMBER, 1938

SCIENTIFIC SERVICE PROGRAMS

Sixty-seven scientific programs were arranged for the following counties:

Lake	Will-Grundy
Fulton	Carroll
Stephenson	JoDaviess
Southern Ill. Med. Assoc.	Kankakee
Hancock	Jersey
Bureau	Greene
DeWitt	Monroe
LaSalle	2nd Councilor Dist.
Coles-Cumberland	Henry
DuPage	Knox
Warren	Wabash
8th Councilor Dist.	Montgomery
Macoupin	Williamson
Scott, Iowa	Beardstown
Effingham	Fulton
Lee	Franklin

Maternal Welfare conferences were held in Jersey-Greene, Knox-Warren, Lake, Montgomery-Macoupin, Stephenson, JoDaviess-Carroll, Bond-Clinton-Marion.

These Maternal Welfare meetings were well attended, perhaps the largest number at one meeting being 300 doctors.

AID TO COUNTY MEDICAL SOCIETIES

The office of the Educational Committee endeavored to promote the scientific meetings of county societies by assisting secretaries in sending invitations. During the two months the Committee prepared the notices for the following counties:

214—Henry
268—2nd Councilor District
84—Crawford-Wabash, Lawrence and Jasper
313—DeKalb and LaSalle
185—Lee

100—Bureau
93—Effingham
98—Franklin
262—Perry
328—8th Councilor District Meeting

RADIO PROGRAM

27—Radio programs were given over stations WAAF, WJJD and WGN. In addition to the broadcasts over these Chicago stations, a number of downstate counties used the same talks for rebroadcasting over their local stations.

A variety of types of programs have been given during the period, including a series of eight by a doctor and his secretary entitled, "Leaves From a Doctor's Diary."

Plans are now being formulated for a series of programs in foreign languages over one of the Chicago stations. There is a real need for this type of program and the talks will be made as simple as possible.

POPULAR PROGRAM FOR THE LAITY

79—Popular health talks were scheduled for lay groups throughout the state. It was interesting to note the variety of audiences and the fact that talks were so widely distributed covering the following cities: Mattoon, Robinson, Effingham, Sterling, Sycamore, Gardner, Oak Park, Chicago, Kewanee, Tremont, Springfield, Carthage, Princeton, Shelbyville, Pittsfield, East Moline, Danville, Alexis, Edwardsville, Woodson, Quincy, Winchester, Rushville, Barry, Mason City, Havana, Dwight, Colfax, Fulton, Olney, Clinton, Pekin, St. Charles, Sheffield, Ziegler, Litchfield, Nashville.

The subject of "Socialized Medicine" holds the leading place in the topics requested for discussion. The Committee has sent much material to college and high school debating teams who are presenting the subject. The American Medical Association has given the Committee much help.

The Committee has cooperated with the Chicago Community Forum Service in scheduling speakers to share in forums in various centers in the metropolitan area.

NEWSPAPER SERVICE

756—Health articles to Illinois newspapers.
141—Health articles to Chicago newspapers.
1,098—Editorial style articles to newspapers.
5,274—Health articles sent to prominent laymen, Home Advisers, Health Chairmen, W.P.A. Teachers, Red Cross, etc.
840—Health articles to libraries.
1,026—Health articles to hospitals.
20—Releases for 2nd Councilor District meeting.
57—Releases for 8th Council District meeting.
73—Releases for DeWitt County Medical Society.
38—Releases for Henry County Medical Society.
27—Releases for Effingham County Medical Society.
50—Releases for Lee County Medical Society.
25—Releases for Bureau County Medical Society.
3—Releases for Clinton County Medical Society.
12—Releases for Wabash County Medical Society.
14—Releases for Chicago Medical Society.

Press articles were written and approved on these subjects:

Diphtheria vs. Immunization.
Fallacies About Infants.
Thanksgiving.
Winter Woes.
The 1939 Outlook.
Discovering Tuberculosis.
Safe at Home?
Influenza Warning.
Thanksgiving Greetings.
Benjamin Franklin.
Joy and Sorrow from the Automobile.
Children and Colds.
Adequate Prenatal Care
Merry Christmas and a Healthy New Year.

MISCELLANEOUS

Copy of Dr. Neal's paper on "Socialization of Medicine" was sent to the entire lay list, libraries and hospitals.

Material prepared and mimeographed for the Illinois Federation of Women's Clubs.

Special material prepared for the Maternal Welfare Committee and articles mimeographed for distribution at public meetings sponsored by the local counties.

Request from the Superintendent of a City School, downstate, that the Committee furnish all pupils in health classes with copies of its health education material.

Request from District Governor of the Lions International for suggested programs suitable for Lions Clubs.

Meeting with a Committee from the Pediatric Society to discuss the handicapped child of Illinois.

Conference with advisor of Harrison Technical High School concerning special programs for freshmen and sophomore students.

Conference with representative of the Chicago Board of Education regarding proposed courses to be offered in Junior College.

Committee invited to have exhibit of its work at the Mid-Winter Meeting of the Chicago Dental Society which is attended by 10,000.

Assistance given to the Scientific Exhibit Committee of the State Society.

Respectfully submitted,
Jean McArthur.

SCHOOLS ASK FOR EDUCATIONAL COMMITTEE MATERIAL

The Educational Committee received the following letter from the Superintendent of Schools of an Illinois city:

"For some time I have been receiving regularly your bulletins. The material is so terse and pertinent that I have called the attention of my teachers of health to them. They are wondering if copies could be secured for each of the members of their classes, 170 in all.

"I realize this is not the use for which the bulle-

tins were intended originally, but I am wondering if you have a plan by which they might be made available."

* * *

The Medical Director of one of the Illinois Tuberculosis Sanatoriums also makes a comment on the material sent out by the Educational Committee:

"You recently sent me a bulletin DISCOVERING TUBERCULOSIS. If possible I should like to have several copies of this bulletin and any others you may have. I think this bulletin DISCOVERING TUBERCULOSIS is the best article on tuberculosis for educational purposes that I have come in contact with."

ILLINOIS STATE MEDICAL SOCIETY

100% PAID FOR 1938

Adams
Alexander
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Clinton
Coles-Cumberland
Crawford
DeKalb
Douglas
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Fayette
Henderson
Henry
Iroquois
Jasper
Jefferson-Hamilton
JoDaviess
Johnson
Knox
McLean
Marion
Mason
Massac
Monroe
Morgan
Piatt
Richland
Schuyler
Shelby
Stephenson
Tazewell
Vermilion
Washington
Wayne
Woodford

I DO NOT LOVE YOU DOCTOR FELL; YOU CARVE TOO FLUENTLY AND WELL

I do not love you, Doctor Fell; the reason why, I'll briefly tell:

The doctor of the olden days had kindly words and pleasant ways; and though his pills were on the bum, and sent folks off to Kingdom Come, and though he liked to swell the hosts of skeletons and sheeted ghosts, it never was his foolish plan to use a saw on every man. Unlike the modern maniacs, who carve their patients with an axe, he dealt out calomel or nux, and soaked us for a pair of bucks, and if he killed us—good old soul! he left us to be planted whole.

When I am sickly and unstrung, you ask me to unfurl my tongue; you feel my pulse and prod my back, and say my liver's out of whack, and then you shed your vest and coat, and push a lantern down my throat, and say: "Great Caesar! What a heart! I'll have to take you all apart." And on your table I am laid, while you go out to hunt a spade, to dig around among my works and find the blamed old germ that lurks around the angles of my frame—the way you carve me is a shame.

When winter comes, with frost and snow, I have a chilblain on my toe; and when for liniment I beg, you want to amputate my leg; and when my throat gets sore and raw, you want to cure it with a saw; to cure my baldness you, I ween, would run me through a guillotine. A leg of mine is now at rest among the doctors of the West; an Eastern doctor has in brine about eight inches of my spine; the jaw that once adorned my mouth, is kept in pickle in the South.

I do not love you, Doctor Fell; you carve too fluently and well; I fear you and your edged tools; I'll send to correspondence schools for absent treatment when I'm ill—or hit the good old-fashioned pill.

—Walt Mason in the Emporia Gazette.

THE AMERICAN CONGRESS ON OBSTETRICS AND GYNECOLOGY

The American Congress on Obstetrics and Gynecology will meet in Cleveland, Ohio, September 11, 1939.

PRELIMINARY PROGRAM OUTLINE
MEDICAL SECTION

(Other sectional programs for mornings and round tables will be published as they are available).

Monday, September 11, 1939

The Thyroid and Pregnancy.
Heart Disease and Pregnancy.
Diabetes and Pregnancy.
Tuberculosis and Pregnancy.
Nutritional Factors and Pregnancy.
The Surgical Abdomen complicated by Pregnancy.
The Treatment of Abortions.

Tuesday, September 12, 1939

The New Conception of Ovarian Neoplasms.
Carcinoma of the Uterus.
Endometriosis.
Ectopic Pregnancy.
Sterility in the Female.

Wednesday, September 13, 1939

Reduction of the Operative Incidence in Obstetrics.
Labor Complicated by the Contracted Pelvis.
Dystocia Due to Soft Parts.
Pathology and Treatment of the Third Stage of Labor.

Thursday, September 14, 1939

Present Day Fundamental Knowledge of Hormones and Endocrine Glands.
Problems of Adolescence.
Problems of Menopause.
Diseases of the Mammary Gland.

Friday, September 15, 1939

Sulfanilamide in Obstetrics and Gynecology.
Pyelitis.
Chronic Pelvic Infections.
Immediate and Remote Complications Following Labor.

ROUND TABLES

Running concurrently each day 11:45 *to* 1:15

The Toxemias of Pregnancy.
Genital Infections.

Obstetric and Gynecologic Hemorrhages.
The Fetus and the Newborn.
Forceps, Occiput-Posterior and Breech Presentation.
Anesthesia, Analgesia and Amnesia in Labor.

JOINT AFTERNOON SESSIONS

Monday, September 11, 1939
Neonatal Care.

Tuesday, September 12, 1939
Plans for Prevention and Control of Uterine Cancer.

Wednesday, September 13, 1939
Extension Education on Maternal and Neonatal Care.

Thursday, September 14, 1939
Economic Aspects of Maternal Care.

Friday, September 15, 1939
Correlation of and Attempt to Digest All Proceedings.

JOINT EVENING SESSIONS

Monday, September 11, 1939
Legal Aspects of Maternity.

Tuesday, September 12, 1939
Humanitarian Aspects.

Wednesday, September 13, 1939
Sociologic Aspects.

Thursday, September 14, 1939
Ethical Aspects.

AID FOR CRIPPLED CHILDREN

Paul H. Harmon, M.D., Superintendent of the Division for Handicapped Children, reports that sixty clinics for crippled children were held in thirty different sites in this State during the Fiscal Year 1937-1938. In these clinics, 1,744 patients were seen. Of this latter number, 783 were recommended for hospital care. Of this number, 45.6 per cent were hospitalized during the fiscal year, and the majority of the whole number was hospitalized by the date of this report (December 1).

A poliomyelitis consulting program was involved and was in operation during the summer of 1938 in the entire State except within the city limits of Chicago where other agencies covered the field. All cases from the sporadic poliomyelitis of 1938 that needed hospital care were sent to hospitals. There were but twenty-five bona fide cases of this disease during the summer of 1938.

Field nursing and social service in relation to crippled children are both available upon a State-wide basis. The field nurses of the Division for Handicapped Children made 10,410 visits during the year. Appliances were furnished to patients attending the clinics in the following numbers: braces, 138; artificial limbs, 39; orthopœdic shoes and shoe corrections, 184. 51,060 days hospital care were provided to crippled children by the Department of Public Welfare. Of this number, 8,426 were in the wards of the general hospitals of the State where orthopœdic surgeons are participating in the plan for orthopœdic care in the Division for Handicapped Children.

AMERICAN BOARD OF OPHTHALMOLOGY

The American Board of Ophthalmology announces an important change in its method of examination of candidates for the Board's certificate.

Examinations will be divided into two parts. Candidates whose applications are accepted will be required to pass a WRITTEN examination which will be held simultaneously in various cities throughout the country approximately 60 days prior to the date of the oral examination.

The WRITTEN examination will include all of the subjects previously covered by the practical and oral examinations.

ORAL examinations will be held at the time and place of the meeting of the American Medical Association and of the American Academy of Ophthalmology and Oto-Laryngology, and occasionally in connection with other important medical meetings. The ORAL examination will be on the following subjects: External Diseases, Ophthalmoscopy, Pathology, Refraction, Ocular Motility, Practical Surgery.

Only those candidates who pass the written examination and who have presented satisfactory case reports will be permitted to appear for the oral examination.

Examinations scheduled for 1939: WRITTEN, March 15th and August 5th. ORAL, St. Louis, May 15th; Chicago, October 6th.

Applications for permission to take the written examination March 15th must be filed with the Secretary not later than February 15th.

Application forms and detailed information should be secured at once from

Dr. John Green, Secretary, 6830 Waterman Ave., St. Louis, Mo.

MEETING OF THE NORTH CENTRAL FORUM OF ALLERGY

Physicians interested in allergy are invited to attend the North Central Forum on Allergy to be held at the Commodore Perry Hotel, Toledo, Sunday, January 15.

The meeting will open with an informal "get-together" Saturday evening, January 14, at the Commodore Perry Hotel. Physicians planning to attend the Forum are urged to arrive in time for this social session which may be the high-light of the meeting.

The program for the two sessions, Sunday, January 15, follows:

Morning Session, 10:00 *A. M.*

1. *Food Allergy—*

"Diagnostic Measures," by Dr. Samuel M. Feinberg, Chicago; discussants, Dr. M. A. Weitz, Cleveland, and Dr. Sam Levine, Detroit.

"Value of Skin Tests in Diagnosis of Food Allergy," by Dr. George Waldbott, Detroit; discussants, Dr. Albert Zoss, Cincinnati, and Dr. I. M. Hinnant, Cleveland.

"Dietary Management of Food Allergy," by Dr. Jonathan Forman, Columbus; discussants, Dr. David M. Cowie, Ann Arbor, and Dr. George L. Lambright, Cleveland.

2. "Drug Hypersensitivity," by Dr. John H. Mitchell, Columbus; discussants, Dr. Barney Credille, Flint, and Dr. Frank Menagh, Detroit.

Luncheon—Crystal Room, Commodore Perry Hotel.

Afternoon Session, 2:00 P. M.

"Preparation of Protein Extracts," by Dr. Milton B. Cohen, Cleveland, discussants, Dr. Leon Unger and Dr. Tell Nelson, Chicago.

"Preparation of Plant Oil Extracts for Diagnosis and Treatment," by Dr. L. E. Seyler, Dayton; discussants, Dr. John Sheldon, Ann Arbor, and Dr. Wm. P. Garver, Cleveland.

(Papers limited to ten minutes each; discussants limited to five minutes).

This meeting was planned to foster acquaintance and exchange of ideas of members of the Cleveland, Chicago, Michigan and Ohio Valley Society of Allergists. However, any physicians, in good professional standing, who are interested in allergy are most welcome.

Further information can be obtained by addressing Dr. Karl D. Figley, 316 Michigan Street, Toledo, Ohio.

CARING FOR THE INSANE

According to U. S. Public Health Service current incidence rates indicate that one of every twenty personos born in 1938 will be committed to a mental hospital some time during his life span.

Because of the increasing proportion of the population in the older age groups, an increase in the number of admissions to mental hospitals is to be expected in the future, since rates of mental disease are highest in the older age brackets.

Since there is no sharp line of demarcation between normality and abnormality, it is practically impossible to determine whether the relative number of persons with mental disease is increasing.

Fundamentally, even though there is a definite physical basis for many mental disorders, mental disease—or insanity, as it is popularly called—is a cultural concept, and varies from one group to another. In some situations the mentally deranged have become soothsayers, medicine men, prophets, or leaders; in other situations the same persons would be incarcerated.

Those conclusions have been developed from a comprehensive study of recent data by Dr. Harold F. Dorn, Statistician, United States Public Health Service. They are discussed by him in a paper, "The Incidence and Future Expectancy of Mental Disease," in the current issue of *Public Health Reports*.

To a certain extent, the increase in the number of first admissions to mental hospitals merely reflects an increase in hospital facilities, Dr. Dorn pointed out. In order to eliminate this factor insofar as it was possible, the data used in this study were the number of first admissions to mental hospitals in Massachusetts, New York, and Illinois where facilities have been fairly adequate for several years. In general, these data do not support the contention that the incidence of mental disorders had been rapidly increasing.

This does not mean, however, that the public burden of caring for persons with mental disease has not been increasing. The average number of patients in State hospitals increased 40% (from 248,852 to 347,620) between 1926 and 1935. But, rather, it means that most of the increase may be attributed to increase in the expectation of life, an increasing proportion of old people in the population, increasing urbanization, and other environmental factors. As the standards of care and treatment are raised, the total cost will increase although there is no increase in the incidence of the disease. (It is estimated that the current annual cost of hospitalized patients alone is between $150,000,000 and $200,000,000, and that these patients occupy 47% of the total number of hospital beds.)

It is gradually becoming accepted, according to Dr. Dorn, that mental aberration is simply a form of illness which may often be cured or alleviated by suitable care and treatment. This attitude is clearly reflected by the fact that the "insane asylums" of fifty years ago have become "mental hospitals" today. Commitment to a hospital is no longer universally regarded with the same horror as formerly.

TOBACCO SMOKE CAUSES CONSTRICTION OF THE BLOOD VESSELS

Doctors E. A. Hines, Jr., and Grace M. Roth of the Mayo Clinic before a staff meeting, August, 1938, stated that cigarets raise the blood pressure in both normal persons and in patients suffering from high blood pressure. Their observations were based on a study of 86 persons.

The effect of tobacco smoking on blood pressure is not due entirely to the action of a stimulus on specially sensitive blood vessel systems. Part of the effect, at least, is a result of some element in tobacco smoke which causes constriction of the blood vessels. This element in the tobacco smoke was not identified in the report made by the two scientists at a recent staff meeting.

The rise in blood pressure following smoking was greater in high blood pressure patients than in normal persons except in the case of high blood pressure patients who had never smoked before. This latter difference is attributed to the fact that inexperienced smokers do not inhale as much smoke as regular smokers.

The test was made by having each person, after a 30-minute rest, smoke two cigarets of a standard brand. Blood pressure and pulse rate were watched during the smoking and for a few minutes afterward. As a control, each person went through the same procedure except that he puffed at an unlighted cigaret.

The results were also compared with results of the cold pressor test, in which one hand is immersed over the wrist in a bucket of ice water. The excessive rises in blood pressure from smoking, the scientists found, occurred only in the patients who had, according to the cold pressor tests, hyperreactive blood vessel systems.

To make its peace with the Department of Justice the American Medical Association might join the C. I. O.

Original Articles

AN APPRAISAL OF COMPULSORY HEALTH INSURANCE

J. R. NEAL, M. D.
Past President, Illinois State Medical Society
SPRINGFIELD, ILL.

Fundamentally the current wave of popular interest in the proposition of making medical care cheaper and more easily available arises from a deep-seated and universal desire for security, happiness and what lately has been dubbed "the more abundant life." In this desire we all share alike. The doctor no less than the banker, the carpenter, the farmer and the business man wishes for himself and his family the best and most tranquil life that may be attained in this precarious and uncertain world. He, like every other person of normal ambition, wishes to feel that there is sufficient stability in economic and social practice to permit him to make plans with a reasonable prospect of fulfillment. National and international affairs have conspired against peace and tranquility during recent years, however, and have moved in a direction to disturb men's minds and try their spirit. Restlessness prevails everywhere. Tranquility is gone. No one feels secure socially, politically and economically. Uncertainty is almost universal. "Chaos" and "madness" are words used freely by men in high places to describe the chief characteristic of the present time. Attempts at changing things long regarded as fundamental have robbed the man in the street of confidence and instilled in his heart a haunting fear.

People everywhere have in this way been placed in the position of a drowning man grasping at whatever he finds within reach. This situation explains all of the reform legislation which we have witnessed, much of it already found by the painful method of trial and error to be basically false and little more than an empty gesture. It explains the popularity of such fantastic schemes as the "Townsend old age pension" the "Huey Long Share the Wealth Plan" and the silly "Thirty Dollars Every Thursday' proposition. It explains in large degree the agitation for some new scheme of medical practice. The idea that health can be maintained through free medical care no matter what else may befall has seized upon the imagination of many people as the way out of a wilderness and greatly to be desired.

No one disputes that better medical care for more people is desirable. No one disputes that the gap between available medical knowledge and practice is too wide for the best interests of society. No one disputes the potentialities of improving health substantially in many respects. That free medical care alone will do the trick or that socialized medicine would be a particularly important factor toward those desirable ends is subject to debate. Sharp differences of opinion prevail, therefore, as to the methods by which better and more satisfactory medical care can best be provided to more people. The proposition of compulsory health insurance or socialized medicine has found favor in some quarters. The soundness and the desirability of this proposition is challenged by the medical profession.

This opposition is founded on solid ground. Compulsory health insurance has been tried extensively and is still operating abroad and schemes of socialized medicine financed in other ways have been established in limited groups for a long time in this country. There is no valid evidence that any of these schemes has produced benefits that cannot be had in other and more satisfactory ways and that have not been equalled and even surpassed by methods which have prevailed generally in the United States.

All of the principal nations of Europe maintain systems of socialized medicine of one kind or another. Most of these schemes have been operating for at least a quarter of a century, some considerably longer. It is significant, therefore, that health conditions in the United States are superior from almost every point of view to those in any of the World Powers of Europe or Asia.

The average life span in the United States, for example, is about 62 years compared with 61 in England, 61 in Germany before the annexation of Austria, 55 in Italy and even less elsewhere in the Scandinavian countries. Several commonwealths in the United States have records fully as favorable as the Scandinavian nations with which they compare in land area and density of population.

The general death rate is lower in the United

Delivered December 6, 1938, before the North Central Illinois Medical Association, LaSalle, Illinois.

States than in any of the Great Powers of Europe. For 1935, the most recent year for which extensive data are available, the death rate per 1000 population in the United States was 10.9, against 11.8 in Germany, 11.7 in England and Wales, 13.6 in Austria, 15.7 in France and 13.9 in Italy. For 1935 the infant death rate was 56 per 1,000 births in the United States, 57 in England, 68 in Germany, 69 in France, 100 in Austria and 101 in Italy. Sharp improvement has taken place in these rates in the United States since 1935 but evidence of similar improvement abroad is lacking.

With respect to communicable diseases the United States enjoys an even greater advantage. From diphtheria, for example the death rate per 10,000 population in the United States in 1935 was 3.3 against a rate of 5 in France, 6.7 in Italy, 9.7 in Germany, 10.1 in England and Wales and 14.9 in Austria. The prevalence rate of diphtheria during the first six months of 1938 was only 9 per 100,000 people in the United States against 23 in France, 29 in Italy, 80 in England and 85 in Germany. For tuberculosis the mortality rates are about 56 in the United States, 72 in Germany, 76 in England and Wales, 90 in Italy, 110 in Austria and 125 in France.

These illustrations give indisputable evidence that the beneficial practical results of medical care have been more abundant in the United States than in any nation of comparable magnitude where socialized medicine has been established.

In our own country we have the army in which socialized medicine is practiced on what is undoubtedly the highest level of communal efficiency. Here again there appears to be no evidence of greater benefits in the results obtained. The general death rate in the Army, which consists of men selected with great care as to physical fitness, varied from 3.8 to 4.3 per 1,000 at risk during the four years ended with 1935, giving an average rate of 4.1. For the same period among hundreds of thousands of male, white wage earners of comparable age insured by the Metropolitan Life Insurance Company, the death rate ranged from 4.1 to 4.4, giving an average of 4.3. If the advantage of selection is discounted, the experience of the industrial wage earners is fully as favorable as that of the Army.

Furthermore, the annual admission to the sick list in the Army averages about 580 per 1,000 at risk. Among 39,000 families of moderate income residing in all parts of the country, monthly visits by nurses employed by the United States Public Health Service to obtain the facts, it was revealed that during a year there were only 516 cases of illness and accidents per 1,000 at risk which caused the loss of as much as one day from the usual activities. These civilian cases, moreover, included pregnancies and the usual ills of children.

In the Army, moreover, about 8 days per man are lost annually because of illness from diseases alone. Records kept by the United States Public Health Services show that sickness and non-industrial accidents causing disability of one week or more, results in the loss of less than 4 days annually per man among industrial employees.

There are official records of actual experience among large groups of people whose medical care is provided through systems of socialized medicine and large groups whose medical care is not so provided. This meets the scientific requirement of having experimental and control groups. The results show no significant advantage whatever to the people for whom socialized medicine has been provided.

It is proclaimed, moreover, by the advocates of compulsory health insurance that the availability of competent medical advice thus provided would discourage self medication and the sale of nostrums. Experience proves that only disappointment awaits those who pin their faith on that presumption. On that point an editorial in the August 20, 1938 issue of *London Lancet*, reads in part as follows:

"In one respect, however, the report devoted to health insurance is disquieting; taking medical service as a whole, increasing reliance seems to be placed on drugs as a means to health. The average number of prescriptions issued per insured person rose from 4.72 in 1936 to 4.75 in 1937 and the average cost from 3s 1½d to 3s 2d . . . The report states that in some cases the treatment of one patient had cost no less than £240 a year in drugs alone. It was hoped that the working of national insurance would bring about a material reduction in self-treatment by the use of patent medicines, but that has not been so. The craving for self-drugging is skillfully fostered in the advertisement columns of the popular press, and the medical profession is not to blame for it, though practitioners may do much to check it by health education among their patients. For

the increased use of drugs in the insurance medical service, however, insurance doctors have a direct responsibility, both in their individual capacity and collectively through the agency of the panel committee."

Another author in *Lancet* declares, by way of explaining the attitude of doctors when faced with economic problems, that physicians are neither more nor less honest than other people and that honesty varies roughly with financial security. "The panel doctor," he adds significantly, "knows that if he does not issue certificates for 'nervous debility' and 'gastric neurasthenia' his patients with their capitation fees will go elsewhere."

There is direct evidence that compulsory health insurance tends to lower the standard of medical practice and that it may actually result in a higher rate of disability from that multitude of poorly defined and poorly understood class of ills that are born of sick minds. There is such a thing as malnutrition of the spirit and it can be cultivated by schemes which encourage malingering and the habit of enjoying poor health. This is an inherent danger in socialized medicine that can neither be dismissed as trivial nor suppressed through rules and regulations.

There is, moreover, no evidence that people generally in the United States are willing to pay the price in the loss of self esteem that socialized medicine is sure to foster to a considerable degree. Red-blooded people resent being investigated. Above all else they wish to be free to take it or leave it in the matter of being doctored.

At Peckham, in London, for example, there exists an agency known as the Pioneer Health Center. It provides all of the practicable medical facilities for 1,530 people. Free medical examinations and free medical treatment are offered in an experimental effort to determine as exactly as possible just how much pathology and illness prevails and what can be done about it. After 18 months of experience it was found that 9 per cent. approved perfectly well, 8 per cent. were diseased and under treatment while 83 per cent. had something the matter but were doing nothing about it. After a study to determine why the procrastination in the 83 per cent. the investigators concluded that adults do not usually care to seek treatment until they are socially disabled.

In an experiment among its employees at weight reduction as a health measure, the Metropolitan Life Insurance Company discovered the same truth. The authors of that project concluded that: "The self-discipline required to maintain a permanent reduction of weight is evidently too severe for most overweights, who, generally, are inclined to self-indulgence."

After a course of dietary treatment given free by medical officers of the company to 294 employee overweights, and which caused a satisfactory loss of excess fat, only 1 in 5 of those checked up at the end of five years after the termination of medical supervision continued to follow the dietary regimen. All of the others had regained all weight lost during the course of treatment and an average of 10% more.

It appears more than probable, therefore, that the great majority of adults in the United States now receive about as much medical care as they are willing to accept. To stimulate a greater desire and a greater demand for medical care, it seems perfectly clear that efforts must be directed along educational lines rather than providing a free service at public expense.

This, indeed, has been demonstrated in the Scandinavian countries which enjoy the most favorable health conditions found anywhere in Europe. A British commission was appointed about a year ago to study the Scandinavian administrative system with respect to syphilis control in order to discover what factors were most important in the rapid suppression of that disease in those nations. It was found that the reduction of syphilis was fully as great in Holland, where neither free treatment nor compulsory notification prevails, as in Denmark and Norway and almost as great as in Sweden where treatment is free to all and where the reporting of cases is required by law. The British Commission concluded that neither free treatment nor compulsion with respect to notification or treatment is a major factor in the control of syphilis. The improvement was attributed largely to a high level of education and intelligence in the population and to a homogeneous people. Undoubtedly these principles would hold good concerning other ills.

If there is little prospect of significant improvement in general from a system of socialized medicine there are good grounds for anticipating serious sociological, political and economic disadvantages from the adoption of such

a scheme. In the first place, the cost would be enormous adding a heavy load to an already tax burdened people. The Interdepartmental Committee appointed by the President estimated that the annual cost of a nation-wide compulsory health insurance system would be at least two and one-half billion dollars, about $20 per head of the entire population. It would be too much to expect that political spoilsmen would not be attracted to an enterprise of such financial magnitude.

An even more serious political danger is inherent in such a proposal. Anything approaching a nation-wide compulsory health insurance scheme would involve a gigantic administrative personnel under governmental domination. This would be a powerful piece of machinery susceptible of employment for political purposes. In the hands of a Huey Long, it could be transformed into a superlative agent of Fascism. It would lend itself admirably to the destruction of political and social freedom.

That a system of compulsory health insurance limited to low income groups would be abused by the well-to-do needs scarcely to be mentioned. We have witnessed the constant liberalization of the Veterans Hospital System until no pretense is now made to limit the service to the financially needy. Newspaper reports have it, moreover, that a member of the President's Cabinet, who was neither the Secretary of the Army or Navy, was admitted to the United States Naval Hospital in Washington for an extended period of recuperation. Inquiry failed to reveal any legal grounds for extending this service to the cabinet member. These illustrations suggest the practices that would undoubtedly evolve on a large scale among the great and the petty administrators of a compulsory health insurance scheme.

It would seem from these observations and considerations that our path in America lies in a direction away from socialized medicine if the best interests of society are served and the principles of democracy preserved. We heartily approve of an extension of the public health service which has already produced benefits of incomparable magnitude. Through efficient and adequate public health service the people generally are educated in preventive medicine and they are protected from preventable diseases more effectively than by any other means that has ever been devised.

We favor an extension of hospital facilities where needed and endorse the pre-payment plans which have proved to be practicable and economical. We favor a system of insurance to protect low-income people from serious financial loss on account of illness. We favor government aid, under local administration, for providing medical and hospital care for the needy in order to spread the cost.

In a special session that met on September 16, 1938, the House of Delegates of the American Medical Association surveyed with great deliberation the whole field of medical care and public health service. It recommended an expansion of public health service as related to certain infectious diseases to maternal and infant welfare and to similar projects with the definite understanding that the need be established and the administration be efficient and economical. It approved the principal of hospital insurance and of *cash indemnity insurance* for meeting the cost of sickness. It recognized the need for complete medical service to the indigent and the necessity for governmental aid in financing this service. It emphasized, with respect to all of these things, however, the establishment of need, local, efficient and economical administration and the maintenance of high professional standards.

The House reaffirmed and emphasized the opposition of organized medicine to any compulsory insurance plan.

The Illinois State Medical Society is in complete accord with the principles and endorsements of the House of Delegates of the American Medical Association. Physicians everywhere are devoted to the cause of better health. Physicians have been responsible for the inauguration and development of public health services and of practically every other organized movement which has brought to the people of the United States a degree of healthful living unequalled in any other great nation in the world. Physicians are unanimous in their desire of continued advancement and improvement in individual and public health. They recognize the pitfalls of socialized schemes, however, and they are determined to preserve the principles of individual freedom, of liberty and of private enterprise in the field of medicine.

THE SEROLOGICAL CONTROL OF NEISSERIAN INFECTIONS BY MEANS OF THE BOUILLON FILTRATE (CORBUS-FERRY): A Further Report*

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Is gonorrhea a systemic infection? If so, are the present-day methods that are accepted as standard for treatment wholly adequate to eradicate the disease?

In 1911 one of us (BCC) called attention[23] to the value of the Wassermann test not only as a diagnostic aid, but also as a serological control in the treatment of syphilis. Time has told the story of its efficacy in the management of this disease.

Complement Fixation Test for Gonorrhea.—The complement deviation reaction was applied to gonorrhea in 1906, but unlike the Wassermann reaction it did not attain the same popularity either as a guide to treatment or as a diagnostic aid. During the last few years numerous articles have been published calling attention to its specific importance. Some of the most outstanding are the following:*

According to Warren, Hinton and Bauer,[1] certain workers signify that it can be relied on as a diagnostic test, yet one finds few clinics in which it is employed with any regularity. Why it has never gained wide acceptance as a diagnostic aid in the study of patients with arthritis is not apparent. In summarizing the tests made on the sera from fifty-two proved cases of gonorrheal arthritis, 80.7% gave positive reactions at all times, while of 239 cases representing other types of arthritis, 91.6% gave consistently negative reactions. They concluded that if the technical imperfection of the method employed can be improved, it is possible that the gonococcus complement fixation test will approach the Wassermann test in its degree of accuracy.

Klamartsik[2] is of the opinion that some day, no doubt, it will be possible to prove with its aid that a case is definitely cured. Recovery is indicated when an intensely positive reaction starts to become negative. This same conclusion was reached independently by the authors after extended personal experience with routine complement fixation.

Cohn[3] believes that the gonococcus complement fixation test is a valuable aid in the determination of a cure when a previous positive reaction becomes negative, while Birnbaum[4] writes that there is no doubt about its usefulness. A positive serologic reaction simply points to the possibility of a gonorrheal infection. Absolute proof is brought about by the demonstration of gonococci in the smear.

Hirshland and Hirshland[5] say that in the satisfactory performance of the complement fixation test for gonorrhea just as for any serological test, a good technic must be strictly adhered to by a responsible technician.

The wholesale examination of sera that is being performed in some clinical as well as some state laboratories cannot help but lead to error. No doubt the complement fixation test will run the gamut of criticism that the Wassermann test did and it will be some time before a routine standard technic can be established.

The authors believe that the complement fixation test in gonorrhea rarely becomes positive before the third week of the disease, and in a simple case of anterior urethritis, if seen early and treated locally, it may never become positive. In systemic invasion and in individuals treated with the bouillon filtrate a positive reaction is to be expected.

The possibility that the gonococcus may invade the system and lie dormant for many years was not generally recognized. However, a review of the literature shows that the rôle of the gonococcus as a causative agent in systemic infections is not new. In 1838, Ricord[6] described the first case of gonorrheal infection of the heart. Osler[7] reported a case of endocarditis with cultivation of the specific organism in 1902, and later Thayer[8] in 1905 reported six cases, and again in 1926 twenty-three cases. In 1934 Stone[9] reported a case of gonorrheal endocarditis, reviewing the literature and reporting 122 cases. He claims the distinction of being the first to report such a case in the Journal of Urology. He also emphasizes the fact that the urologist

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Appended is a bibliography of the complement fixation test for gonorrhea for the last eight years.

should recognize the condition during its incipient state before the heart is irreparably damaged.

Williams[10] in January, 1938, made a study of twelve cases with ten postmortem examinations and states that 150 authenticated cases plus the author's twelve cases, making a total of 162 cases, have been reported. Gonococcal endocarditis was noted in 0.7% of 1719 autopsies at the Vanderbilt University Hospital during the past twelve years.

Spink and Keefer[11] demonstrated the gonococcus in the synovial fluid in an arthritic knee twenty years after an infection. Fraser and Dye[12] report an exacerbation of latent gonorrheal urethritis fifty years later, following a prostatectomy.

Thomas[13] and Irons[14] believe that instances of mild gonococcal septicemia, which ordinarily recover, are considerably more common than is usually recognized.

There is no doubt that grave consequences following gonococcal infections may and do occur, and one is surprised to discover, in making a survey, that the infection can be localized in practically any organ and lie dormant for many years. The following list of systemic infections of the gonococcus have been taken from the world's literature for the last 22 years.

Abscesses	7
Subcutaneous and subfascial	1
Subdiaphragmatic	1
Muscle	5
Kidney	23
Bone	6
Endocarditis	67
Liver	6
Lung	3
Meningitis	13
Nerve	1
Pelvic peritonitis in male	1
Purpura and skin	15
Septicemia	105
Tenosynovitis	3
Thyroid	2
Vein	1
Iritis	3
Parotid gland	1
There are 8 cases of septicemia in children following volvovaginitis and ophthalmia neonatorum, making a total of	265

A complete bibliography of the above group of cases accompanies this paper.

As most of the systemic complications of gonorrhea are seen by internists and reported in journals other than urological, there are undoubtedly many more interesting cases than are here recorded. Every case of systemic invasion of the gonococcus must be considered as a septicemia, varying in its severity.

Skin rashes and erythema nodosum frequently accompany symptoms of the systemic manifestation. However, they are not pathognomonic, as they occur in other infectious diseases, especially chronic tuberculosis. They are considered as allergic manifestations of the infection. The culturing of the gonococcus from the blood stream in septicemia and also in endocarditis is not an uncommon occurrence. The gonococcus has been identified both by staining and culture from the sputum where the lung[15] is involved; also in the thyroid[16] and parotid gland.[17] It is generally accepted that once the infection has gained entrance into the body, it extends by contiguity along the genital tract in the male as in the female, and spreads by the blood stream or lymphatics from foci secondarily established in the body. In many of the cases reported there is a history of gonorrheal arthritis.

Like syphilis, the symptoms of this infection are often so bizarre that its recognition is not always possible. A careful analysis of statistics shows that this infection is on the increase. As we become more conscious of the existence of this disease and the serious possibilities of its latency, greater efforts are being put forward in making a diagnosis and standardizing a rational therapy.

The predisposing factors of this systemic invasion are:

1. Complications resulting from failure in making an exact diagnosis.
2. Traumatism.
3. Inadequate treatment.
4. Lack of criteria for ascertaining when a given patient is "cured."
5. Poor resistance of the host.
6. Virulence of the organism.

From the many different methods of treatment suggested it is obvious that there is a lack of standardization. The following, at the present time, are the most generally accepted:

1. Local by means of bactericides.
2. Hyperpyrexia.
3. Chemotherapy (sulfanilamide).
4. Passive immunization with antitoxin.

1. *Local Treatment.* It is the only method that can be employed in treating gonorrhea as a local disease. However, it is entirely inadequate when the infection becomes systemic.

2. *Hyperpyrexia.* Of all the methods in use, hyperpyrexia alone has shown its efficacy in destroying the gonococcus whenever it has invaded the human organism. Its application, however, is a heroic measure and necessitates hospitalization and special equipment.

3. *Chemotherapy.* Considerable literature has been published during the last year showing the efficacy of sulfanilamide. It is highly bacteriostatic, however, it lacks the power to stimulate the defense mechanism of immunity and may at times be destructive to the formed elements of the hemopoietic system.

4. *Passive Immunization with Antitoxin.*—Anwyl-Davies[18] of St. Thomas Hospital, London, in 1937 reported his experience in treating 178 cases of Neisserian infections with gonococcal antitoxin prepared from horses immunized with the Corbus-Ferry bouillon filtrate. *His publication furnished conclusive evidence of the specificity of the bouillon filtrate.* He says: "Acute and chronic cases, complicated and uncomplicated, respond equally well, which is in marked distinction to other biological preparations hitherto available." As it is an alien serum, administration is frequently associated with severe serum reactions. However, we recommend its use in severe infections such as gonorrheal ophthalmia, later followed by intradermal active immunization with the bouillon filtrate, serologically controlled with complement fixation tests.

The defensive mechanism of immunity in man having been recognized, a gonococcal exotoxin[19] discovered, and the safest method of introducing it applied, how can the treatment of Neisserian infections be improved upon?

Cutaneous Test. An individual infected with the gonococcus is in a state of hypersensitivity to the gonococcus and remains so until he is cured of his infection. With a proper toxin (antigen), antibodies in the blood that are specific for the gonococcus will unite and show a specific cutaneous test. Conversely, with the disappearance of the infection, antibodies are no longer present in the blood and the test becomes negative. This may be concluded as positive evidence of a cure.

Conrad[20] in 1936 reported favorably upon his experience with the cutaneous test as a diagnostic aid. (Gonorrhea.)

Recently Wishengrad[21] of the central Gonorrhea Clinic of New York reports its use as a diagnostic test in from 150 to 200 cases. He finds the test easy to read when it is definitely negative or positive. He says further, "I have come to rely on it with a great deal of confidence." Wishengrad used the regular standard therapeutic product, controlling it with the culture media instead of the heated product that was originally reported by the senior author. However, he waits forty-eight hours before interpreting the reaction.

Cumming and Burhans[22] have shown that following a cutaneous test, local gonococcal foci are often stimulated (this may be associated with pain in the locus foci), and it is possible to identify the gonococcus by cultural and staining methods in foci that were previously negative. This is comparable to the Herxheimer reaction in syphilis. Where a clinical history points strongly to the possibility of a gonococcal infection, this test should be repeated, using 0.2 c.c. of the filtrate instead of 0.1 c.c.

Numerous French and German authorities have advocated the use of tuberculin in surgical tuberculosis where the state of hypersensitivity is not great, and we ourselves have successfully treated bladder and epididymal tuberculosis with intradermal injections of tuberculin for the last several years.

An individual infected with any organism is in a state of hypersensitivity to that organism as long as it remains in the body. The underlying rationale of the intradermal toxin therapy rests upon the concept that the infected patient is in a state of hypersensitivity to the gonococcus. This means that wherever the organism localizes, either in the primary or secondary sites, there is an over-response to its presence with excessive destruction of tissue. An added indication of this state of hypersensitivity is also to be found in the blood serum of infected individuals as demonstrated by the presence of complement-fixing antibodies.

This is strictly a desensitization technic which overcomes a destructive allergic aspect of the response but not the immunity.

The more likely mechanism responsible for the success of the gonococcal toxin therapy is clearly demonstrated by the following phenomena:

1. Eventual fall in the complement fixation titre.
2. Diminution in response to skin injection.

3. Decrease in the exudative phase of the local lesions.

A given patient with a positive complement fixation test is in a state of hypersensitivity to the gonococcus. He is desensitized to the gonococcus by giving the toxin intradermally.

A given patient with a negative complement fixation test is injected until he is in a state of hypersensitivity and continued on the same management until desensitization is complete (negative complement fixation).

This is comparable to desensitizing a patient with asthma, who has a hypersensitivity to eggs, with small initial doses of egg white.

With increasing evidence that gonorrhea is a systemic disease, during the last eighteen months, both in private and clinic practice, the following plan of treating these infections with bouillon filtrate has been adopted:

First Week—First Day

1. Examination:
   a. By smear.
   b. By culture of discharge.
2. Cutaneous test; read results in 24 and 48 hours.
3. Complement fixation text for gonorrhea.
4. Therapeutic dose.

Fig. 1. Intradermal injection. Immunological response to proteins introduced intradermally is greater than that produced by any other route except intravenously.

Once a diagnosis has been made establishing the degree of involvement of an infected individual, it is not necessary to make a complement fixation test every week, but we have done this to control our work more accurately. Once in two or three weeks should suffice.

Whenever it is possible it seems advisable to follow the suggestion of Wishengrad, namely, to give 0.1 c.c. of filtrate every other day. If at any time the local tissue reaction is over two inches, the repeated injections might be delayed one day. If it is not possible to see a given case but once a week, commence with 0.1 c.c. and increase the dose cautiously each week. Never increase the size of the dose if the preceding one has caused a cutaneous response larger than two inches. In chronic infections where weekly treatments are given, it is permissible to start

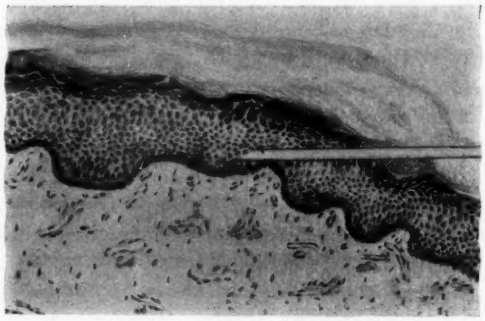

Fig. 2. Note rich vascularity of true skin.

with a larger dose, 0.2 c.c. When the size of the dose has been increased gradually to 0.3 c.c., negative serological results can be obtained if the dose is not further increased.

As the size of the dose is increased and the general immunity is acquired, the complement fixation test will become first one plus, then two plus, later to four plus. Gradually it will return in like fashion to a negative. Nevertheless, there may still remain a discharge with threads in the urine. If a given patient has been followed carefully, he needs no further immunization for at least four weeks as by this time his symptoms should clear up entirely. If at any time the complement fixation test turns from a one plus or two plus positive to a negative test, stop injections and await clinical symptoms for two weeks. Where there is any possible suspicion of prostatic or even posterior involvement, gentle massage should be given once a week. Notwithstanding the fact that the clinical symptoms have subsided, a continued positive complement fixation test means that the patient is not cured and that there may be trouble ahead.

Chronic infections due to other organisms and occasionally psoriasis may provoke a false positive response.

Local Treatment. No local treatment or medication of any kind is given except sedatives

where indicated. The use of haliver oil with viosterol is substituted for the old time balsam medication.

The ingestion of five to seven glasses of water a day is imperative.

Good drainage must be provided for by the wearing of a gonorrheal bag, also a suitable suspensory to avoid epididymitis.

The fact that the patient is under this type of management does not lessen the dangers of overactivity while the disease is being treated. I have found the following prescription of value as a uninary sedative.

℞

Codeinæ sulphatis	0.25
Tincture hyoscyami	15.00
Syrupi gaultheriæ	30.00
Aquæ gaultheriæ q.s.ad	120.00

M. et Sig: One teaspoonful in water q. 4-6 hours.

This standardization of treatment is particularly adapted to dispensary practice for the following reasons: (1) The patients report for treatment but once a week; (2) no local treatment whatsoever is given, consequently it entails less expenditure and is convenient for both patient and physician; (3) complications are reduced to a minimum.

CASE REPORTS

We have treated in our private practice from January, 1937, to January, 1938, thirty cases: two females and twenty-eight males. The shortest time a patient was able to obtain a clinical as well as a serological cure was eight weeks, and the longest sixteen weeks. Two patients have maintained a positive complement fixation test in spite of a clinical cure. In this group of cases, the youngest was twenty-eight years of age and the oldest fifty-five years. As would be expected, younger individuals acquire their immunity faster than those of advanced years.

At the Evanston Social Hygiene Clinic, there

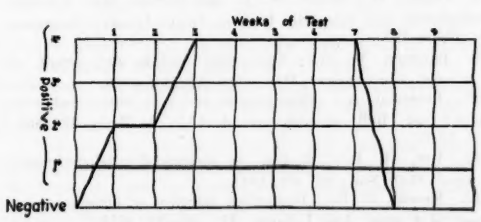

Fig. 3. Age, 28 years. Duration of treatment, 8 weeks. Shortest case under treatment: injection every other day.

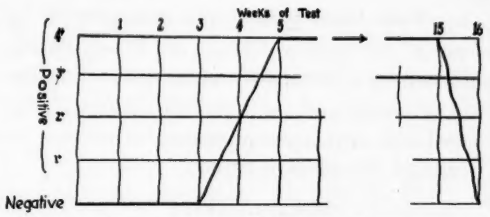

Fig. 4. Age, 55 years. Duration of treatment, 16 weeks. Longest case under treatment: injections once a week.

have been treated from July, 1937, to April 30, 1938, fifty-six cases. Forty-two obtained a clinical cure. Twenty-seven patients in this group still had positive serological findings. We believe this lack of correlation was due to the fact that these patients, after disappearance of their clinical symptoms, did not report regularly to the clinic for further check-up.

The total number of cases treated, both private and clinic patients, is eighty-six.

There have been two complications: one case of epididymitis in both clinical and private practice.

SUMMARY

Systemic invasion is a common occurrence in Neisserian infections and is often accompanied by serious or even fatal complications. If not detected and eradicated early, it may lie dormant for years before revealing its destructive pathologic changes. A positive complement fixation test means that the gonococcus (antigen) has extended past local barriers. In none of the methods that are accepted as standard for treatment is there a positive method of ascertaining when a patient is cured. The use of the "beer test," the passage of sounds, and the application of silver nitrate appear somewhat old-fashioned and at best only empiric.

CONCLUSIONS

1. Clinical observation leads to the importance of treating the gonococcus as a systemic infection rather than merely a local invasion.

2. The necessity of absolute eradication and positive proof thereof must be recognized.

3. The American Neisserian Society recommends in part the following in the management of gonococcal infections: "To avoid any procedure which in itself damages tissue and thus retards recovery or causes complications. To remember that there are no short cuts to the cure of gonorrhea."

4. With the serobiological management by means of the bouillon filtrate, one is occasionally surprised at the rapidity of a cure. But the final eradication of the infection is often a prolonged and meticulous procedure.

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DISCUSSION

Dr. B. C. Corbus, Jr., Chicago: I would like to mention the experience I have had with 12 cases of gonorrheal arthritis on the Urological Service of the Cook County Hospital. They all complained of symptoms of 12 to 18 months' duration, with chronic joints and feeling very badly. We put them to bed and started them on intravenous therapy, beginning with 2/20 each time and increasing the dose 1/20 each week. These patients had violent rigors and elevation of temperature and showed marked improvement locally and generally after each injection. The average stay in the hospital varied between eight and ten weeks per case.

Dr. Corbus, in closing: It is our plan to treat these patients until they are not only clinically well, but to continue treatment until they are serologically negative. We are just starting to use the complement fixation test both as a guide to treatment and also as a diagnostic test. In this paper there is a complete bibliography of the complement fixation test as reviewed in the literature for the last eight years. There is enough evidence from very good men all over the world to make us recognize the value of this test. We treat our cases until they are clinically well and we go on and treat them until they are seriologically well also, because we believe that unless a patient is serologically cured as well as clinically well, there may be trouble ahead. We were not familiar with the fact until recently that the average individual with simple gonorrhea, after the third week, according to many serologists, will many times show a positive complement fixation test.

Sulfanilamide is a splendid drug but one does not know positively when a given patient is well. Because

the discharge clears and the urine has no threads in it does not mean that the patient is well, as often you will find the mucus from the urethra loaded with gonococci and no pus.

It seems to me that the rational method of treating this disease is by way of the blood stream because many *of these infections, if not already systemic, later be-* come so.

EXPERIMENTAL AND CLINICAL STUDIES ON THE RELATION OF STREPTOCOCCI TO VARIOUS DISEASES*

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Your president suggested that I present on *this occasion a review of my work on streptococci.* In doing so, I propose to emphasize especially the results of those studies on which much of the work, seemingly unrelated, rests.** Most important among these are the following: the transmutation of pneumococci and streptococci; transfer of the virulence to nonvirulent pneumococci by soaking them in sterile extracts of highly virulent pneumococci (virulin); the experimental *production of "anaphylatoxin" and a relatively* nontoxic antigen useful in the treatment *of lobar pneumonia by autolysis of pneumococci* and the sensitization cross-wise of guinea-pigs to *suspensions of pneumococci and streptococci; the* changes which occur in localizing power in animals of organisms of the pneumococcus-streptococcus group as virulence decreases from cultivation on artificial mediums and as it increases on successive passage through animals; the studies on focal infection and elective localization; and the studies with Jensen on electrophoresis of streptococci.

MUTATION OF PNEUMOCOCCI AND STREPTOCOCCI

It was found very early that when pneumococci were grown under unfavorable conditions (stress and strain), such as in mediums with increased oxygen tension, in hypertonic and hypotonic broth, on blood-agar slants allowed to evaporate, and in symbiosis with Bacillus subtilis, changes *in cultural characteristics, morphology and sero-* logic properties occurred. In short, they lost type *specificity, virulence, capsule, bile solubility,* inulin-fermenting power, and other properties *characteristic of pneumococci, and they acquired* the morphology, cultural features, serologic reactions, virulence and other properties of certain strains of green-producing and hemolytic streptococci. The changes were shown to be complete, according to all tests known, including the Marmorek test. Every important change was checked and repeated in order to rule out all possibility of contamination. Since the changes were often *abrupt and the newly acquired properties tended* to persist, the changes observed were considered *to be true mutations. For the reverse change,* that of streptococci into pneumococci, passage *through animals was necessary. Every possible* precaution was taken in these experiments to *avoid accidental contamination. The changes* observed occurred in orderly sequence in the course of numerous experiments. The pure line requirement was fulfilled. For these reasons the changes observed were considered to have been induced. It was concluded that mutations in this group of organisms could occur and that these were of great importance as a cause in the rise and fall of epidemic and other diseases, that pre*cise classification in this group was not possible,* and that the disease-producing power of the *organisms was far more important than their* fermenting and other properties. These conclu*sions have since been fully justified by the many* corroborative studies of others on dissociation of *pneumococci and streptococci, and in my own* studies more or less continually since this work *was first reported and recently,* under strictly controlled conditions, by a serial dilution method. *Figures 1 and 2 a, b, c,* show how completely one strain of hemolytic streptococcus was converted serologically and morphologically into encapsulated pneumococci.

Changes in virulence and localizing power of streptococci. It was during the experiments on mutation that the discovery was made that as *organisms lose or gain virulence, their affinity* for different tissues or organs changes. Thus, *ulcer of the stomach was not observed in the* course of any of thirteen passages through rabbits of a streptococcus that had been cultivated for a long time, whereas in six additional pass-

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*Address delivered at a joint meeting of the Tri-State Hospital Assembly and the Society of Illinois Bacteriologists, May 6, 1938, Chicago.

**References to my own work and that of others are given in connection with papers published in the Dental Cosmos, July, 1934; in International Clinics, vol. 2, series 40, 1930 (J. B. Lippincott Company); and in Verhandlungen der deutschen Gesellschaft für innere Medizin, XLII. Kongress, Wiesbaden, 1930.

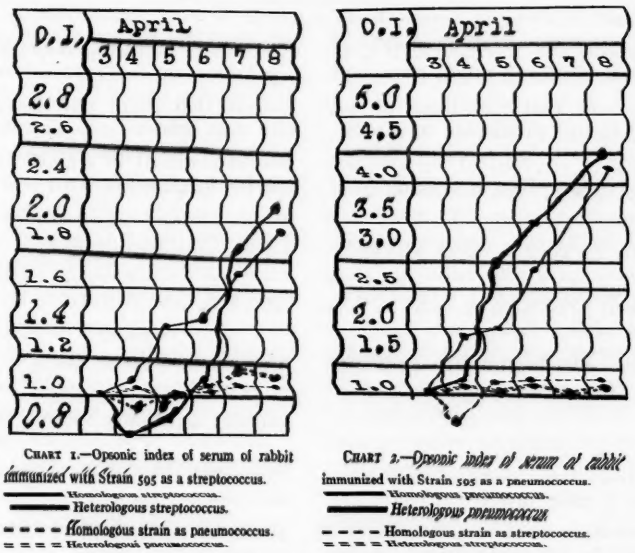

CHART 1.—Opsonic index of serum of rabbit immunized with Strain 595 as a streptococcus.
Homologous streptococcus.
Heterologous streptococcus.
Homologous strain as pneumococcus.
Heterologous pneumococcus.

CHART 2.—Opsonic index of serum of rabbit immunized with Strain 595 as a pneumococcus.
Homologous pneumococcus.
Heterologous pneumococcus.
Homologous strain as streptococcus.
Heterologous streptococcus.

Fig. 1. Graphs showing serologic specificity of one strain as a streptococcus and as a pneumococcus.

ages ulcer was found in three instances. A strain of a pneumococcus that had lost almost all virulence and that had acquired the properties of a Streptococcus viridans was passed successively through twenty rabbits. During fifteen passages ulcer was not produced but in the next five passages ulcer of the stomach was found in two animals. The strains of streptococci obtained in studies of rheumatic fever produced ulcer of the stomach in two of sixteen animals in the first animal passage, in seven of eighteen animals after from two to five passages, and in only one of eight animals in from six to ten passages. Iritis, or other lesions of the eye, to cite the results with just one of a series of strains, was not observed in the course of any of eighteen successive passages through rabbits of a pneumococcus which had long since lost virulence, but the conditions occurred in all animals which were given injection in the nineteenth and twentieth passages. In subsequent passages, again, lesions of the eye were not obtained. If the lesions in the eyes really depended on a certain degree of virulence of the streptococcus, then the associated lesions in other organs should have been similar following like injection of the different strains. This was found to be the case. Thus, of forty-five animals that had lesions of the eye, twenty-eight had arthritis; five, hemorrhages in the appendix; eight, ulcer of the stomach; ten, lesions of the endocardium; eight, lesions of the pericardium; nineteen, lesions of muscles or fascia, and twelve, lesions of the kidneys. The incidence of these associated lesions in animals corresponded roughly to those which are commonly found in examination of patients. From these and similar experiments it was concluded that different diseases may be attributable to originally the same strain having acquired peculiar virulence and other properties, depending on environment or other conditions.

ELECTIVE LOCALIZATION OF STREPTOCOCCI

The results of experiments on animal passage suggested that the bacteria, predominantly streptococci, in chronic, low-grade, often symptomless,

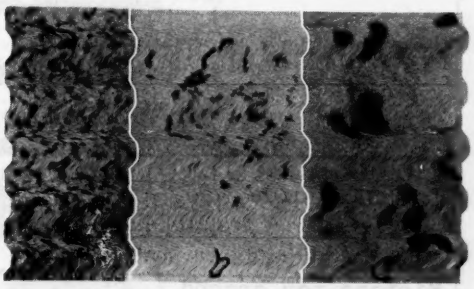

Fig. 2. Characteristic morphology of one strain (*a*) as a hemolytic streptococcus; (*b*) as a Streptococcus viridans; (*c*) as an encapsulated pneumococcus. (Gram stain, x1000.)

foci of infection (such as those in tonsils, teeth, sinuses, prostate gland and uterine cervix), although of low general virulence, might have high specific virulence, and that infections of low grade in symptomless foci predispose to disease, as was so thoroughly emphasized by the late Frank Billings and others. The studies on focal infection and elective localization made by myself and coworkers, by Haden, Jones and Newsom, and many others, have fully borne out these basic principles, well illustrated in table 1. The results recorded in table 1 represent a summary of repeated studies. The technic was essentially alike throughout. The variable was the disease under study.

In order to meet the objection raised against injection of relatively large doses of cultures in these experiments, I have injected directly suspensions in salt solution of the small amount of material that could be expressed from infected tonsils and prostate glands, or that could be aspirated from pyorrheal pockets, and have obtained extremely specific effects with organisms grown in vivo, effects similar to those following injection of cultures. Experimental proof of the importance of one type of chronic focus of infection, that about pulpless teeth, was obtained with dogs whose teeth were infected with streptococci obtained in studies of different diseases. Specific localization, with reproduction of several disease-entities, occurred in a series of dogs; this is well illustrated in table 2. Jones and Newsom have had similar results in heart disease. From these and the experiments on intravenous injection, it was concluded that foci of infection afford favorable conditions for growth and entrance of organisms and their toxic products and for organisms to acquire specific localizing power.

In studies of streptococci isolated from foci or from involved tissues of patients who had various diseases, changes in localizing power, brought about by cultivation on artificial mediums and by successive animal passage occurred; these changes were similar to those induced in saprophytized strains and occurred regardless of the original source of the streptococci. Thus, local-

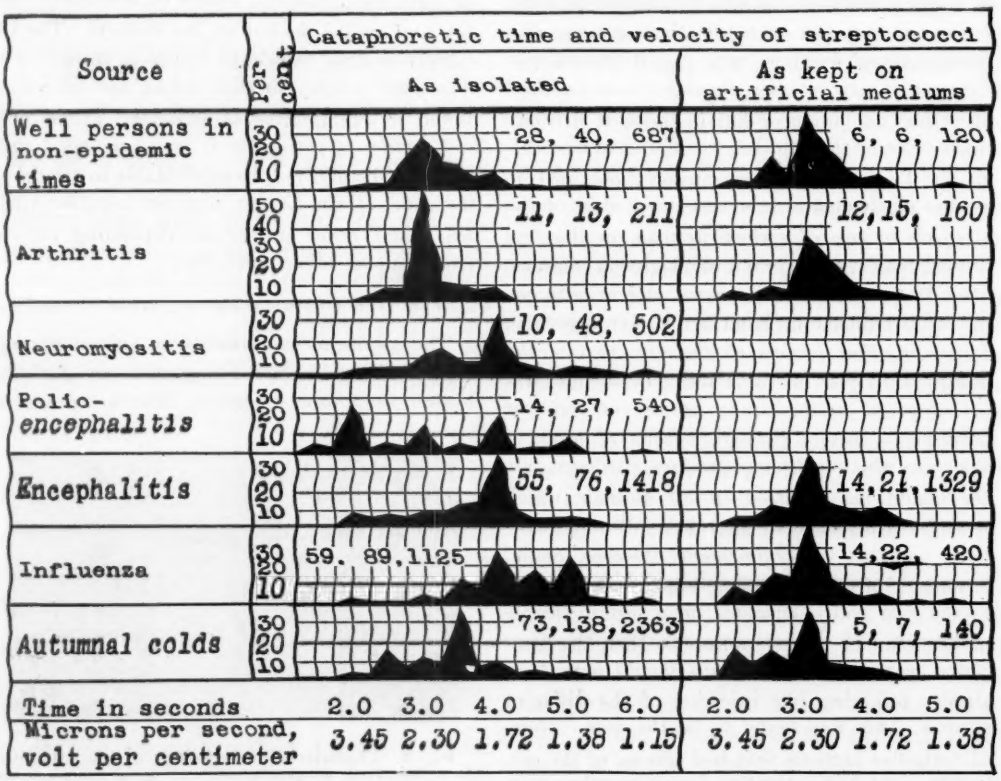

Fig. 3. Distribution curves of cataphoretic time and velocity of streptococci obtained from patients having various diseases, as isolated in dextrose-brain broth and after prolonged cultivation on artificial mediums.

ization resulting in grossly visible lesions of the appendix occurred in 68 per cent of rabbits which received injections of streptococci as isolated from foci and appendixes of patients who had acute appendicitis, whereas after cultivation of these strains for only a short time the incidence dropped to 18 per cent and after animal passage to 45 per cent. Similarly, in herpes zoster, ulcer of the stomach, cholecystitis and erythema nodosum, the high incidence of specific lesions in animals that received injections of the respective streptococci as isolated from foci and involved tissues became much lower after cultivation and after animal passage.

It has been emphasized repeatedly that lesions of the lungs almost never occur following intravenous injection of pneumococci or streptococci of low virulence, when lesions of joints, eyes, muscles and stomach occur, but they do occur commonly following injection of highly virulent strains when affinity for joints, eyes, and so forth, has been lost. Thus, lesions of the lungs almost never occurred following injection of Streptococcus viridans as isolated in cases of subacute bacterial endocarditis, but were commonly observed after these strains had lost affinity for the endocardium and had acquired high virulence and other properties of pneumococci from many successive passages through animals. Likewise, streptococci from patients who had ulcer of the stomach, cholecystitis, rheumatic fever, and erythema nodosum failed to produce lesions in the lungs on isolation and after cultivation, whereas after animal passage lesions occurred in the lungs of animals which received injection.

It has been shown that filtrates of actively growing cultures and the heat or formalin-killed bacteria from strains of streptococci having specific or elective localizing power produced, on intravenous injection, lesions in the same tissues or organs as did the corresponding living culture, and that with loss of elective localizing power of the living streptococci the specific toxin was no longer demonstrable in filtrates and in the dead streptococci. In other words, elective localization of bacteria occurs for the same basic reason that specific localization or action of certain drugs and chemicals occurs.

It has been found, recently, that intracerebral injection of living streptococci or of the corresponding dead bacteria and filtrates of active cultures sufficed to cause systemic lesions more or less characteristic of the disease under study. The systemic localization of the living streptococci, the dead organisms and the filtrates in a series of experiments in myasthenia gravis, encephalitis and ulcer of the stomach or duodenum, are summarized in table 3. The incidence of lesions in the tissues of animals corresponding to those involved in the respective diseases was much higher than in the other tissues or organs. Intracerebral injection of streptococci or pneumococci isolated from the nasopharynx or sputum of persons suffering from respiratory infections, such as colds, sore throat, influenza, bronchopneumonia and bronchial asthma, was followed

TABLE 1. ELECTIVE LOCALIZATION OF STREPTOCOCCI AS ISOLATED IN VARIOUS DISEASES—SUMMARY OF RESULTS

Disease Groups	Strains	Animals injected	Percentage of animals showing lesions in: Appendix	Stomach, duodenum, or both	Gall-bladder	Joints	Muscles	Nerves	Kidneys	Skin	Endocardium	Myocardium	Eyes	Lungs	Intestines	Liver
Appendicitis	85	222	68	10	1	22.7	7.7	0	2.7	0	19	5.4	1	0	2.7	0
Gastro-duodenal ulcer	354	1539	2	65	6.6	8.8	1.9	0.6	4.5	0.6	5	1.4	0.6	0.6	2.7	0.6
Cholecystitis	56	177	0	32	45	9.6	5.6	0	6.8	1.7	6.8	5	0	4.5	12.4	0
Chronic ulcerative colitis	206	527	0	0.8	0.6	1.3	0.4	0	0.8	0	1.3	0	0	0	58*	0
Rheumatic fever	24	71	8.5	41	2.8	66	26.8	0	39.4	5.6	46.5	43.7	9.9	4	12.7	0
Erythema nodosum	9	53	0	3.8	0	18.9	32	0	7.6	60.4	9.4	0	1.9	1.9	1.9	0
Chronic arthritis	723	1477	0.6	7.9	2	52.8	11.9	0.4	8.3	0.4	5.5	0.7	0.4	2.3	0.5	0.2
Myositis	192	891	0.5	13.7	2.2	29.3	72	8.7	9.2	3.4	10.3	14.5	1.0	6.2	0.7	0.1
Neuritis	24	124	3	5	1.6	12	32	65	9.7	0	4.9	9.7	0	13.7	3	0
Nephritis	17	64	0	4.7	1.6	9.4	11	0	59.4	0	3	4.7	0	0	0	0
Pyelonephritis	50	168	0.6	6.5	1.8	11.9	9.5	0.6	73	0	4.8	4	0	0	3	0.6
Herpes zoster	29	115	5	21	9.6	13	14.8	0	4.4	60	3.5	3.5	9.6	15.7	13	0
Endocarditis	29	109	0	6.4	1.8	17.4	2.8	0	11.9	0.9	76	9	0	11	7.4	0
Iridocyclitis	87	272	0.4	2.2	0.8	5.2	3.3	1	2.6	0.8	2.9	0	41.6	2.6	0.4	0
Controls	534	1329	2.3	14.2	4.5	18.4	13.5	2.9	8.7	2.8	10.6	6.4	0.8	8	5.2	1.2

*Colon.

in a large series of tests by severe congestion of the mucous membrane of the trachea and bronchi, hemorrhagic edema of lungs and bronchopneumonia. The lesions in the lungs often resembled those regularly at hand, or which occur as complications, in these respective diseases.

THE RELATION OF FOCI OF INFECTION AND STREPTOCOCCI TO HYPERSENSITIVENESS AND ALLERGY

Recent experimental and clinical studies indicate that allergy or sensitization plays an important rôle in the production of symptoms and lesions, especially in chronic disease. In my studies evidence has been obtained to show that sensitization is often related specifically to chronic foci of infection and to streptococci having elective localizing and necrotizing power.

Many years ago it was found that when suspensions of pneumococci and certain strains of streptococci and other bacteria were incubated under ether a highly toxic substance (anaphylatoxin) was formed, which, on injection into guinea-pigs and dogs, produced essentially the same symptoms and other changes (anaphylaxis) which occur in sensitized animals on reinjection of the sensitizing substance. A similar toxic substance was demonstrated in material from infected tonsils, in the exudate of pneumonic lungs and in suspensions of pneumococci and leukocytes. In certain acute streptococcal infections, notably in acute influenzal pneumonia with expanded chest and emphysematous lungs, unusually large amounts of "anaphylatoxin" having ominous import have been demonstrated. Moreover, it was shown that the formation of this highly toxic substance and its later disappearance in vitro was associated with proteolysis, but which did not destroy specific antigenicity, and that the highly toxic substance prevented phagocytosis and formation of antibodies. The soluble extracts, after toxicity had disappeared, and the partially autolyzed pneumococci were highly antigenic and so nontoxic that it was possible to give patients injections of amounts one thousand times as great as of the unautolyzed material without causing untoward reaction. It was thought that since large numbers of partially autolyzed pneumococci were found in the lung exudate in lobar pneumonia at the time of crisis, the injection of large doses of the partially autolyzed pneumococci might supply the conditions necessary (specific carbohydrates conjugated to the detoxified pneumococcus protein, perhaps) for crisis to occur in the early stages in this disease. Extensive clinical studies have shown that this is often possible. A highly useful antigen, partially autolyzed pneumococci, now widely used in the treatment of lobar pneumonia, resulted.

Patients who had chronic infectious arthritis, chronic or recurring iritis, iridocyclitis and uveitis, neurofibromyositis, and especially myasthenia gravis, often have been found to be extremely sensitive to specific streptococcal vaccines. Exacerbations of symptoms occur chiefly in the structures chronically involved. The injection, often of exceedingly small doses, of killed organisms (one one-hundredth to one ten-thousandth of the usual amounts) which did not effect perceptibly well persons, caused exacerbations in persons who had these or other chronic diseases. Moreover, it has been found in many cases that by giving the specific streptococcal vaccines in sufficiently small doses, desensitization, as with pollens, was accomplished with concomitant clinical improvement.

TABLE 2. ELECTIVE LOCALIZATION OF STREPTOCOCCI FOLLOWING INOCULATION INTO THE TEETH OF DOGS

Diseases	Number of strains	Number of dogs	Dogs that developed lesions in: Urinary tract (Calculi)	Stomach	Colon	Joints	Other organs
Nephrolithiasis	9	34	25 (75%)	0	0	0	0
Alkaline phosphatic cystitis	2	5	3 (60%)	0	0	0	0
Ulcer of stomach	3	20	0	13 (65%)	0	0	0
Chronic ulcerative colitis	15	15	0	0	7 (47%)	0	0
Chronic arthritis	16	40	0	0	0	0	0
Miscellaneous (Cholecystitis, iritis, encephalitis, spasmodic torticollis chronic poliomyelitis, goiter, abortion, et cetera)	23	38	5 (13%)	0	0	0	0
Control group—dogs whose teeth were not inoculated	..	1014	51 (5%)	6 (0.6%)	0	0	0

THE RELATION OF STREPTOCOCCI TO DISEASES OF THE NERVOUS SYSTEM

In the studies on elective localization examples of extremely specific effects often were noted. This was especially true in the studies on herpes zoster, supposedly a virus disease, and according to Campbell and Head a form of acute posterior poliomyelitis. Herpes of the skin and lesions of corresponding ganglions occurred following intravenous injection, sometimes of extremely small numbers of streptococci. Owing to these and other similar results the idea occurred to me that a streptococcus having highly specific properties might have etiologic significance in acute anterior poliomyelitis, regardless of the fact that the cause of this disease had been shown to be a filtrable virus. Opportunity to test this hypothesis was first afforded during the epidemic of 1916. A pleomorphic, green-producing streptococcus which produced flaccid paralysis as the outstanding effect in rabbits and guinea-pigs was isolated consistently from the nasopharynx and emulsions of spinal cord of a series of patients ill with, or who had died from, typical epidemic poliomyelitis. The streptococcus was demonstrated in or adjacent to the lesions in the spinal cord and has since been isolated consistently from atria of infection and spinal fluid in life and from the spinal cords of patients who had died from epidemic or sporadic poliomyelitis. By the use of dextrose-brain broth and other favorable mediums this streptococcus has been isolated consistently also from the spinal fluid and spinal cords of many monkeys that have developed typical poliomyelitis following inoculation of different strains of the virus. Pleomorphic streptococci have been demonstrated in the lesions in monkeys and in filtrates of active virus by the use of special staining methods. I can mention here only a few of the proofs which indicate etiologic significance of the streptococcus in poliomyelitis and encephalitis. References and detailed results will be found in the original papers.

Thus far it has not been possible, by means of the streptococcus, to reproduce consistently in the monkey typical poliomyelitis such as occurs following inoculation of virus. However, by the use of a medium consisting of infantile tissue in which acid is not produced by growth of streptococci (autoclaved chick-mash) I have succeeded recently in making transmissible, filtrable virus from the streptococcus far removed from the original source, and even from streptococci having "neurotropic" properties but isolated from sources other than patients who had poliomyelitis. The experimentally produced virus strains resist glycerolation for a long time (a year or more) as does natural virus.

Likewise streptococci have been isolated in studies of encephalitis and allied diseases of the nervous system. With these streptococci the main symptoms of the respective diseases have been reproduced in animals and a virus phase also has been developed. The results of these and other experiments indicate that acute epidemic poliomyelitis and encephalitis are primary streptococcal infections and that as these occur a "virus" phase of the streptococcus develops.

CATAPHORESIS OF STEPTOCOCCI

At the suggestion of, and with the assistance of, your president, L. B. Jensen, a study of the electrical state of streptococci having elective lo-

TABLE 3. INCIDENCE OF LESIONS PRODUCED IN ANIMALS BY INTRACEREBRAL INJECTION OF LIVING AND HEAT-KILLED STREPTOCOCCI AND FILTRATES OF CULTURES

Streptococci from patients with:	Material injected	Number of strains	Animals injected	Mortality, per cent	Incidence of lesions, per cent										
					Joints	Muscles	Nerves	Stomach or duodenum H*	Stomach or duodenum U**	Gallbladder	Kidneys	Thymus	Lymph nodes	Lungs	Myocardium	Endocardium
Myasthenia gravis	Live streptococci	28	57	87	0	49	10	5	0	0	2	5	0	10	0	4
	Dead streptococci	4	5	60	0	60	20	0	0	0	0	0	0	0	0	0
	Filtrate	8	9	25	0	55	11	0	0	0	0	0	0	0	0	0
Encephalitis and allied diseases	Live streptococci	12	33	73	3	6	0	6	3	0	0	0	0	12	0	3
	Dead streptococci	7	8	38	0	14	0	0	0	0	0	0	0	0	0	0
	Filtrate	6	6	33	0	0	0	0	0	0	0	0	0	0	0	0
Ulcer of stomach or duodenum	Live streptococci	14	17	41	0	6	0	82	47	0	0	0	6	17	0	0
	Dead streptococci	3	5	20	0	0	0	60	40	0	0	0	0	0	0	0
Normal controls	Filtrate	5	7	53	0	0	0	71	28	0	0	0	0	14	0	0
	Live streptococci	7	7	28	14	14	0	0	0	0	0	0	0	0	0	0

*H—hemorrhage; **U—ulcer.

calizing power was undertaken. In a series of experiments, reported in the literature, it was found that the distribution curves of cataphoretic velocity of streptococci as isolated in studies of different diseases were characteristic, that they often paralleled elective localizing power, that characteristic cataphoretic velocity and localizing power often disappeared simultaneously and that the medium, dextrose-brain broth, found so useful for isolation of causative streptococci, was especially favorable for studies of cataphoresis. The average distribution curves of cataphoretic velocity of the streptococci, as isolated and after prolonged cultivation on artificial mediums, are given in figure 3; the streptococci were obtained in studies of several disease-entities and from well controls. The difference between the strains as isolated from patients who had different diseases is striking, yet all, on prolonged artificial cultivation, became like those from the throats of well persons. From these experiments it is concluded that the poor results obtained from the use of vaccines for the prevention and treatment of disease is owing largely to the fact that the vaccines usually are prepared from strains of organisms that have lost specific antigenic properties from prolonged growth on artificial mediums.

SEROLOGIC PROOF OF SPECIFICITY OF STREPTOCOCCI

Owing to the great variability of streptococci, the prompt loss of specific properties on artificial cultivation, their tendency to agglutinate spontaneously as grown on the usual mediums, and the use of inadequate methods of agglutination with the serums of patients, little evidence has been obtained to indicate causal relationship of streptococci to chronic disease. In a large measure these difficulties have been overcome by the use of dextrose-brain broth for the primary isolation, by growing the streptococci for purposes of agglutination in this medium or in dextrose broth for one culture generation and by preserving the centrifuged streptococci in dense suspension in glycerol (2 parts) and 25 per cent. solution of sodium chloride (1 part). One cubic centimeter of this menstruum was made to contain the growth of from 50 to 500 c.c. of the culture. The antigens for agglutination were prepared by diluting the suspension in glycerol-salt solution to the density of a broth culture with salt solution to which 0.2 per cent. phenol was added. The patient's serum was likewise diluted in salt solution to which 0.2 per cent. phenol was added, to one-half the desired dilution and then 0.2 c.c. of suspension and serum dilutions were mixed and placed at 50°C. for from eighteen to twenty-four hours, when readings were made. Highly specific results were obtained with many, but not with all, of the serums obtained from patients who had chronic disease.

The streptococci isolated, grown and preserved in the manner indicated were found highly satisfactory also for the demonstration of specific cataphoretic slowing action (antibody-antigen reaction) of the respective serums from patients who had chronic infections of low grade, for the

TABLE 4. PRECIPITATION REACTION WITH THE SERUM OF PATIENTS AND THE SERUM OF HORSES HYPERIMMUNIZED WITH STREPTOCOCCI

Source of serums (antigens)	Cases studied	Percentage of positive reactions with: Antiserums prepared with streptococci from: Encephalitis	Poliomyelitis	Chronic ulcerative colitis	Myasthenia gravis	Chronic infectious arthritis	Control serums: Pneumococcus, I, II, III	Normal horse
Encephalitis	55	78	31	40	45	64	0	0
Spasmodic torticollis	12	75	41	41	25	58	0	13
Chronic poliomyelitis	20	50	60	30	25	35	0	5
Acute poliomyelitis (Human beings)	28	46	64	4	17	18	0	7
Acute poliomyelitis (Monkeys)	9	55	89	44	33	33	0	0
Neuritis, herpes, hiccup	12	92	8	33	17	42	0	0
Epidemic gastro-enteritis	51	67	33	90	60	45	0	0
Myasthenia gravis	8	63	25	38	88	75	0	13
Neurofibromyositis	24	63	29	41	33	83	0	13
Asthmatic bronchitis	16	68	25	37	31	37	0	0
Chronic infectious arthritis	12	50	8	8	8	67	0	0
Iritis	11	27	9	9	0	45	0	0
Normal controls	48	8	0	6	2	10	0	0

preparation of hyperimmune serums in horses and for agglutination experiments with these antiserums. Moreover, the antiserums prepared in this way caused precipitation (antibody-antigen reaction), often specifically, when overlaid in small precipitin tubes with cleared washings in salt solution of nasopharyngeal swabbings or with the serum of patients. The results summarized in table 4 show how very specific this reaction was with the serums from the respective patients. The demonstration by the precipitation test of the common presence of streptococcal antigen in the serums of patients who had chronic disease that was antigenically related to the streptococcus with which the reacting serum was prepared is new and, from the standpoint of pathogenesis and specific therapy, is of great importance.

It was found that intradermal injections of the euglobulin fraction of the antiserum prepared in horses, in the manner indicated, elicited an immediate (ten minutes) erythematous-edematous reaction in patients suffering from a streptococcal disease identical to, or closely related to, the one in studies of which the immunizing strain of streptococcus was isolated. This test is an application to streptococcal diseases of the Foshay antigen-antibody reaction, first noted in relation to tularemia. It serves to determine whether a patient is suffering from a streptococcal infection; if so, of what particular type and what antiserum or stock vaccine had best be used therapeutically. The results recorded in table 5 well illustrate how specific the test is as applied in different diseases.

STREPTOCOCCAL VACCINES AND ANTISERUMS

The results from the use of streptococcal vaccines have been extensive and especially favorable in the prevention and treatment of epidemic colds and influenza, bronchial asthma and other respiratory infections. The respective vaccines and antiserums prepared in the way indicated have been shown to have value in the treatment of ulcerative colitis, ulcer of the stomach, arthritis, neurofibromyositis, and in about a third of cases of different forms of chronic encephalitis, spasmodic torticollis, multiple sclerosis and chronic poliomyelitis. Prevention of exacerbations and arrest or retardation of the disease, with only relatively slight improvement in symptoms, is all that can be hoped for in those cases in which irreversible changes have occurred. The encephalitis antistreptococcus serum or, to be more definite, the particular antiserum which elicits the immediate cutaneous erythematous reaction, often has been found to have striking curative effects in acute encephalitis and in epidemic persistent hiccough, even if the hiccough has occurred following operation. The immune

TABLE 5. ERYTHEMATOUS REACTIONS TO INTRADERMAL INJECTION OF THE EUGLOBULIN FRACTION OF ANTISTREPTOCOCCAL SERUMS

Source of serums (antigens)	Persons tested	Average reactions (sq. cm.) to: Euglobulins prepared with streptococci from: Encephalitis: Chronic	Encephalitis: Acute*	Poliomyelitis: Typical	Poliomyelitis: Los Angeles	Chronic ulcerative colitis	Ulcer of stomach or duodenum	Myasthenia gravis	Chronic infectious arthritis	Iritis	Pyelonephritis	Control serums: Pneumococcus I, II, III	Control serums: Normal horse
Encephalitis	92	6	5	3	3	3	2	2	3	..	0	1	0
Spasmodic torticollis	30	5	4	4	4	1	2	4	5	..	..	1	1
Hiccup	10	10	8	4	..	1	..	1	2	..	..	1	1
Amyotrophic lateral sclerosis	19	4	5	5	8	..	..	5	1	..	..	..	0
Chronic poliomyelitis	27	3	2	8	8	6	..	3	2	..	..	1	0
Optic or peripheral neuritis	17	8	7	7	..	..	..	3	4	..	..	1	0
Chronic ulcerative colitis	13	5	..	..	3	10	4	..	5	..	2	1	1
Epidemic gastro-enteritis	69	3	..	..	..	12	3	2	5	..	1	2	1
Ulcer of stomach	39	5	3	4	5	10	11	..	4	..	2	0	0
Neuromyositis and fibrositis	35	5	5	6	5	4	2	3	9	3	3	0	0
Rheumatic arthritis, neuromyositis and carditis	28	5	5	5	..	4	..	..	9	1	..	2	0
Myasthenia gravis	19	4	2	2	..	1	..	11	3	..	..	1	1
Chronic infectious arthritis	42	3	3	0	3	3	3	1	8	..	2	2	0
Osteitis deformans	10	3	2	..	1	..	..	1	8	..	..	..	0
Iritis	12	6	..	1	..	5	..	..	14	11	..	4	1
Pyelonephritis	19	1	8	1	..	5	2	..	3	..	9	3	0
Diseases not due to streptococci	33	0	0	1	..	1	0	0	1	..	1	0	0
Well persons	32	1	..	1	..	1	1	0	1	..	..	1	1

*St. Louis type.

serum prepared with the streptococcus obtained in studies of acute poliomyelitis has been shown to have curative action, especially in the early stages of many cases of poliomyelitis, during every epidemic since 1917 in which it was used. In recent studies it has been found that intradermal injection of this serum causes an immediate erythematous antigen-antibody reaction in the prepoliomyelitic, or infective, stage and throughout the attack in acute poliomyelitis. The therapeutic injection of the serum in this early stage causes the cutaneous reactivity, fever and other symptoms to disappear promptly, without injury to the nervous system. Intradermal injection of the poliomyelitis antistreptococcus serum in cases of chronic poliomyelitis nearly always elicits an immediate reaction and in some of these cases intramuscular injection of from 2 to 3 c.c. twice weekly seems to arrest the disease.

The studies on the relation of streptococci to various diseases and on methods for the preparation of relatively nontoxic vaccines and specific antiserums and for their use in prevention and treatment, indicate that the following simple procedures will suffice in most instances for isolation of specific or causative streptococci and for preparation of useful vaccines and serums.

Material is swabbed from high in the nasopharynx, without touching the tongue, by the use of cotton-wrapped swabs of aluminum wire bent to a suitable angle. Pus is expressed and scooped from the depths of tonsils by means of a small laryngeal mirror (1.5 cm. in diameter) bent to an angle of about 45 degrees. The exudate from the depths of pyorrheal pockets is aspirated into capillary pipets, also bent to a suitable angle. Pulpless teeth are extracted under sterile precautions and cultures are made from the apical ends after they have been cut off with bone-cutting forceps. Swabbings are made from the uterine cervix under aseptic precautions. Material expressed from the prostate gland is collected in sterile tubes but before the material is expressed the anterior urethra is irrigated with sodium chloride solution and the meatus is sterilized. With the aid of the proctoscope swabbings are made from rectal ulcers in cases of ulcerative colitis. Tissues are removed under sterile precautions and are emulsified in salt solution in sterile air chambers or bacteriologic hoods. Sputum and extirpated tonsils are washed in salt solution before cultures are made. Cultures from these and other materials are made routinely on the surface of blood-agar plates for the detection of aerobes. Since specific streptococci from closed foci, such as those at the apices of teeth, and since the specific strains from open foci mixed with saprophytes or saprophytic variants of specific strains require a reduced oxygen tension for growth, cultures are also made in deep tubes of dextrose-brain broth and soft dextrose-brain agar. The media were prepared from dehydrated broth or meat extract and peptone in the usual concentrations, to which 0.2 per cent. dextrose and 0.1 per cent. decolorized fuchsin (Andrade's indicator) (and in the case of agar, 0.25 per cent. agar) were added. The reaction was adjusted to pH 7.0. Approximately 18 c.c. of the media were placed in tall tubes (20 x 1.5 cm.) and to each tube two or three pieces of fresh calf brain, a total of about 3 c.c. in volume, were added before autoclaving (20 pounds for twenty minutes). The inoculated mediums are incubated at 35° C. over night. If the primary dextrose-brain broth and dextrose-brain agar tubes are free from gas, and if smears disclose the presence of a pure culture of large streptococci of uniform size, in short chains, or a great preponderance of streptococci, the culture may be considered satisfactory for the preparation of an autogenous vaccine. The supernatant growth is centrifuged and the sediment suspended in the glycerol-salt solution. The growth from 15 c.c. of broth is suspended in about 0.1 c.c. of the menstruum. Larger amounts of sediment are made more concentrated. The longer these strains are kept in the glycerol-salt solution the less toxic the vaccine is and for this reason stock vaccines often are more useful than autogenous vaccines. These stock vaccines can be prepared by pooling suspensions that may remain after autogenous vaccines have been prepared for individual cases.

Autogenous vaccines are made by diluting the glycerol-salt solution suspension in sodium chloride solution to the density of a dextrose-brain broth culture (approximately 2 billion organisms per cubic centimeter) and heating the diluted suspension at 70 or 75°C. for an hour. Tests for sterility are then made in dextrose-brain broth and 0.2 per cent phenol is added to the suspension. In the preparation of many thousands of vaccines, heated to 70 or 75°C. for an hour, growth of streptococci never has been

obtained. In most diseases such as ulcer of the stomach, chronic sinusitis, encephalitis, spasmodic torticollis, chronic poliomyelitis, amyotrophic lateral sclerosis and multiple sclerosis, the respective vaccines are used undiluted, or diluted 1 to 10 in salt solution to which 0.2 per cent. phenol was added. For cases of chronic infectious arthritis, iritis and other diseases of the eye, chronic myositis, dermatomyositis, neurofibromyositis and bronchial asthma, the vaccines are diluted routinely 1 to 100, and for cases of myasthenia gravis, 1 to 1,000 or as high as 1 to 100,000. Routinely, for adults 0.1 c.c. is injected subcutaneously for the first dose. It is important that all vaccines be injected immediately beneath the skin, preferably in the relatively insensitive area of the arm between biceps and triceps. If an untoward reaction does not occur the dose is increased by 0.1 c.c. twice weekly until 1 c.c. is reached, when 1 c.c. is given weekly for an indefinite period, depending on results obtained. The reaction of the patient, however, should be the chief guide to dosage rather than the prescribed schedule. The aim should be to keep the dose small enough that increased tolerance to the vaccine is obtained. If this is accomplished clinical improvement usually occurs. If tolerance is not increased, or if sensitivity to the vaccine is increased and improvement does not occur, the dose, regardless of the amount in cubic centimeters, may be considered to be too large and should be reduced even a hundred or a thousand fold, if need be, and then gradually increased. If a given dose is followed by favorable results, this dose may be repeated a number of times before the amount is increased. Subcutaneous lumps should be avoided. Their occurrence is indicative of increasing sensitivity instead of increased tolerance.

For immunization of horses and preparation of most stock vaccines, only those strains of streptococci which produce more or less characteristic symptoms and lesions in animals are used. The streptococci from cultures injected and the streptococci isolated from the characteristic lesions produced are grown in dextrose-brain broth, and then for one culture generation in large volumes of 0.2 per cent. dextrose-broth. The growth from the dextrose-broth is harvested by a continuous-feed centrifuge and this is suspended in the glycerol-salt solution menstruum so that 1 c.c. represents the growth of from 500 to 1,000 c.c. of broth culture. These dense suspensions are then diluted as needed at intervals throughout the period of immunization of horses, and for administration to patients they are diluted to the density of the broth culture. Both are usually heated from 70 to 75° C. for an hour, as in the case of autogenous vaccines.

COMMENT

A summary of many studies made by special methods, on the relation of streptococci to various epidemic and other diseases is reported. The importance of the use of mediums, such as dextrose-brain broth, which afford a gradient of oxygen tension and other favorable conditions for the primary isolation and subsequent cultivation of the streptococcus, and the changes or mutations which tend to occur on cultivation on artificial mediums and on animal passage, are emphasized. Experimental evidence is cited indicating the importance of foci of infection and of the streptococcus having elective localizing power in rendering the involved tissues of patients hypersensitive or allergic to streptococci and their toxic products.

Streptococci having elective localizing power and characteristic cataphoretic velocity and other specific properties have been demonstrated repeatedly in foci of infection and elsewhere over a period of years (carrier state) in patients suffering from various chronic diseases such as arthritis and encephalitis. This indicates that the patients' tissues or tissue fluids afford the conditions favorable for streptococci to acquire and maintain specific properties peculiar to the disease in question. Constitutional predisposition to disease may be due, in part, to a peculiar interrelation between host and parasite, such as this, and not wholly to inherited "weakness" of certain organs or tissues, as is generally believed.

The etiologic relationship of streptococci has been shown by their constant presence in different diseases, by the production of characteristic symptoms and lesions in animals, by cataphoresis, by specific agglutination and precipitation tests and by the intradermal injection of specific antiserums. Methods for the preparation and use of highly specific antiserums and highly specific, yet relatively nontoxic, vaccines are described.

My close association with the late Frank Bil-

lings, with Hektoen and with clinicians of The Mayo Clinic has been most helpful in understanding the nature of the problems involved and in interpretation of experimental results obtained throughout now these many years of study.

THE DIAGNOSTIC VALUE OF STERNAL MARROW ASPIRATIONS

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With increasing knowledge in the field of hematology it becomes more evident that a complete blood study should include a study of the bone marrow. The blood picture does not always accurately reflect the underlying pathologic process that exists in the blood forming organs. Conditions presenting anemia may be associated with a hypoplasia or hyperplasia of erythropoiesis; leukopenic states with a hypoplastic or hyperplastic granulopoietic tissue and diseases associated with thrombocytopenia may show a normal or increaed number of megakaryocytes in the bone marrow. In an attempt to find a method that was simple, practical and at the same time informative from a clinical point of view, those in general use in the examination of bone marrow were studied and will be discussed. For sake of brevity the methods to be discussed are as follows:

Bone marrow sections.
Bone marrow smears.
Imprint or "Abklatsch" preparations of bone marrow.
Serum suspension of "emulsion" of bone marrow cells.
Sternal marrow aspiration.

Methods in general use.
Concentration of bone marrow cells.

1. Technique for making differential bone marrow counts.
2. Technique for making "tissue" appearance preparations.

Supravital staining of bone marrow cells.

I. *An Evaluation of the Methods in Use in the Study of Bone Marrow.*

Bone Marrow Sections. This method has been described in detail by Custer. Briefly it consists in the removal (by means of a trephine) of a small plug of bone from the midsternum in the region of the fourth intercostal space. This is immediately placed in Zenker's solution containing five per cent. glacial acetic acid sufficient for decalcification. The sections after fixation are prepared in the usual way with paraffin and stained with eosin-azure or Giemsa. They are excellent for showing the relative distribution of cells. They do not however, demonstrate delicate cellular morphology and thus do not yield accurate differential counts. The method requires a surgical "set-up" and repetition of the procedure is limited. Scars result from the operation and this is of esthetic importance for women and children.

Bone Marrow Smears. The cavity resulting from the removal of the plug of bone is carefully scraped with a fine curette, bits of bone being removed which are then gently smeared on glass slides. The smears are stained either with Wright's stain or with Giemsa stain. Although this method gives beautiful preparations, the disadvantage is that a bone marrow biopsy is required.

Imprint or "Abklatsch" Preparation of Bone Marrow. Bits of bone obtained by biopsy serve as minute serial preparations. The fresh surface of the marrow is gently touched to a slide or cover glass without pressure and dried rapidly by "whipping" through the air. These are stained with Wright's or Giemsa stain (Pappenheim's Modification) except that a double concentration of Giemsa stain as recommended by Ferrata is used. Eight or more imprints are made on one slide or cover glass (these are mounted in Xylol-balsam) and the peripheral portion of each is suitable for examination. This method is ideal for study because it approaches the spread of a bone marrow section while retaining the fine cellular morphology as seen in a bone marrow smear. This method is also limited because of the surgical procedure.

Serum Suspension or "Emulsion" of Bone Marrow Cells. Fresh bone marrow or bits of bone marrow scraped from the cavity after the removal of the small plug of bone is mixed with serum until a thick emulsion is formed. Coverglass films are made from this material and stained with Wright's or Giemsa stain. According to Isaacs the principle of the technique de-

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pends upon the fact that the blood serum dissolves the intercellular connective tissue substance, liberating the individual cells, and changing them chemically so that they stain like cells of the blood stream. The disadvantage is that a trephine is required, and the number of serial observations that may be made on the same individual is limited.

Sternal Marrow Aspiration. The technique in general use is as follows: With the patient lying on his back the region over the sternomanubral junction including the area down to the fourth intercostal space in the midsternum is prepared with iodine and alcohol. The sternomanubral junction or the upper border of the third rib in the midline, preferable the latter is the best sight for puncture. An 18-gauge spinal needle which has been shortened to two to three inches is inserted at an angle of 45 degrees, with the point directed toward the head of the patient, into the marrow cavity. Entrance into the marrow cavity is recognized by a "sudden" give (comparable to the "feeling" when one has entered the spinal canal when doing a spinal puncture) of the needle. This indicates that the outer table (anterior lamina of the sternum) has been perforated. A tight-fitting dry syringe (2, 5, 10 or 20 c.c.) is attached to the needle after the stylet has been removed and from 0.1 c.c. to 2.0 c.c. of marrow is withdrawn. In infants and young children the anterior lamina is cartilaginous and no difficulty is experienced in entering the marrow space. In fact the tendency is to force the needle in too deeply. When suction is applied and no marrow is aspirated, the needle should be slowly withdrawn until the bone marrow material appears in the syringe. Usually if a successful sample of bone marrow has been obtained a more or less dense suspension of small tissue particles will be visible. If 0.1 c.c. or 0.2 c.c. of marrow has been removed, fixed, supravital films, nucleated cells and megakaryocyte counts are made immediately. The remaining material is permitted to coagulate and form a small fibrin clot, which is then fixed in formalin, embedded, sectioned and stained as any other tissue. Young and Osgood aspirate 1 or 2 c.c. of marrow and discharge this material into a tube containing 2 to 4 mg. of powdered potassium oxalate and make complete hematologic examinations from oxalated bone marrow.

Reich, by means of a special constructed needle which must be driven into the sternum, aspirates 10 c.c. of bloody fluid. This material is mixed with 2 c.c. of 1.4% sodium oxalate solution, centrifuged and smears are made of the buffy coat. The fixed smears are stained in the usual way. Vogel, in some of his bone marrow studies, aspirated 2 c.c. of marrow fluid and placed this material in a sterile tube containing one drop of 30% sodium citrate. The citrated marrow fluid is then placed in a Wintrobe tube and centrifuged for five to ten minutes. After a relative accurate red cell volume, white cell volume and platelet volume is determined, the white cell layer is removed with a capillary pipette, mixed to insure uniformity and smears made. The distortion of cellular morphology brought about by oxalated bone marow is one of the disadvantages of this method.

Concentration of Bone Marrow Cells. 1. The patient is prepared as for sternal aspiration.

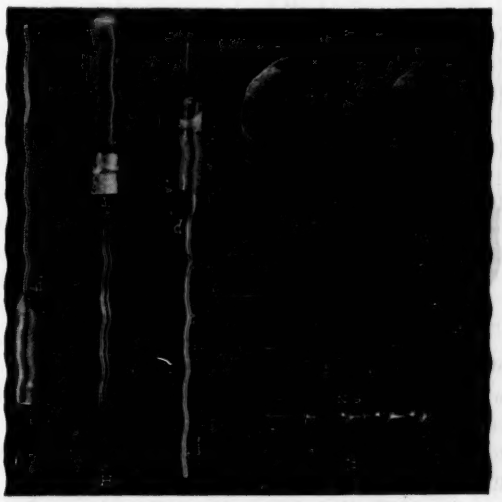

Chart I. Apparatus for Sternal Aspiration, Concentration and Study of Bone Marrow Cells.
S. N., sternal needle; T., paraffin-lined tube containing heparin; P., paraffin-lined pipettes; H., hematocrit (Wintrobe) tube; W., paraffin-lined watch glasses; S_1, 18x22 mm. rectanguar coverglass; S_2, standard microslide.

The type of needle used is one devised by Klima and Rosegger* modified for a Luer syringe attachment and thus an adapter as required for the original needle is not necessary. A five c.c. syringe is attached to the needle after

*In obese individuals it may be necessary to remove the "guard" from the sternal needle before attempting to enter the sternum.

it has been inserted and the piston of the syringe is rapidly and partially withdrawn and held firmly until the marrow appears. One c.c. of bone marrow and not more is withdrawn and discharged into a paraffin-lined tube containing a small amount of heparin. When this amount of marrow is aspirated practically all patients complain of a sudden temporary "suction" pain. The tube is gently inserted several times and by means of a paraffin-lined pipette (old type Wintrobe pipette with the large bore) the 1 c.c. of bone marrow is placed in a Wintrobe hematrocrit tube and centrifuged for exactly five minutes at high speed. After centrifugation the volume

Chart 2.
Concentration of Bone Marrow Aspiration

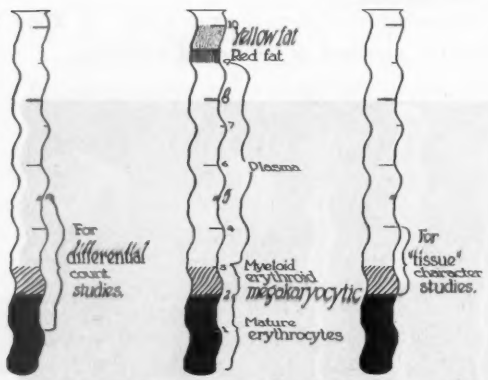

Chart II. Methods of Studying Bone Marrow Cells by Concentration Technique.

of the different layers is recorded. The fat layer which may be seen at the top of the tube in most cases is first removed. The height of the myeloid-erythroid layer in the hematocrit is determined and an equal volume of red cells is marked on the tube, then the supernatant plasma is drawn off with a pipette, until the plasma volume is equal to the combined myeloid-erythroid and erythrocyte layers. With a paraffin-lined pipette, the plasma, myeloid-erythroid and erythrocyte layers are withdrawn, discharged into a paraffin-lined watch glass and thoroughly mixed. A small drop is transferred to a slightly warm microslide and with a 18x22 mm. rectangular coverglass (same thickness as the counting chamber coverglass) a margin free smear is made. After the marrow preparation has been air-dried by whipping through the air, it is ready for staining.

This method is essentially the same as used by Schleicher and Sharp. Erythrocytes and myeloid-erythroid layer in a ratio of 1:1 is adopted as an arbitrary standard. This technique is ideal for differential studies of bone marrow cells.

2. For making "tissue" appearance preparations, a volume of plasma equal to the column of myeloid-erythroid cells in the hematocrit tube is withdrawn, discharged into a paraffin-lined watch glass, thoroughly mixed and smears made from this mixture as described above. Other hematological studies such as supravital films, nucleated cells and megakaryocyte counts can be made from the material as described for either of these two methods. The smears are treated with Wright's stain or May-Grünwald Giemsa. When Wright's stain is used, allow the stain to act for one minute then dilute with as much distilled water as the slide will hold, mixing very thoroughly. Allow this to stand 15-20 minutes, then wash with distilled water and air-dry. May-Grünwald-Giemsa technique is as follows: The slide is placed into (A) 0.3% alcoholic May-Grünwald solution* for three minutes. (B) Without washing, place slide into a freshly made-up dilute May-Grünwald solution for one minute (May-Grünwald solution and distilled water equal parts). (C) The slide is then removed and placed on a staining rack covered with 3 c.c. of dilute Giemsa solution (Giemsa stock solution one drop plus distilled water one cubic centimeter) for five minutes. (D) Finally, rinse with distilled water until the water returns clear while tilting the slide, then place in a vertical position and allow to air-dry. If this procedure is followed there will be obtained clear and well-tinted smears. This has been true in over 1500 preparations stained according to this method. Smears made according to this technique give bone marrow patterns comparable to those seen in bone marrow sections—thus they are called "tissue-like" preparations. Using the oil-immersion objective a differential count may be performed. This is simplified by the use of an ocular which contains a Whipple grid to divide

*One hundred cubic centimeters of absolute methyl alcohol are warmed to 50 degrees C. To the warm alcohol is added, in minute portions, 0.3 gm. of May-Grünwald dye powder. After each addition of the dye the solution is shaken vigorously, when solution is complete, allow to stand for twenty-four hours, filter into a brown or blue bottle and store in a cool place. The dilute solution used in staining should be replaced daily. (In hot weather the diluted stain may deteriorate in two to three hours.) It is very important to keep the dye and buffer solutions cool.

the field into segments. At least 95% or more of all cells are identifiable in a well-made preparation. According to this method deviations from the normal bone-marrow pattern can be readily learned. The concentration technique has the advantage over other methods of sternal aspiration in that "myeloid-erythroid" hypoplasia or hyperplasia may be relatively accurately measured. Thus quantitative changes (hematocrit) as well as qualitative findings (differential count of bone marrow cells) may be correlated. This method has been found to be of value in pernicious anemia, aplastic anemias, leukemias, leukopenic conditions, etc.

Composition of layers in the Hematocrit Tube (Chart II). The erythrocyte layer consists of mature red blood cells, most of which are derived from the bone marrow sinusoids. The separation of these cells which would otherwise cause a dilution of the myeloid elements is another advantage of the concentration method.

The "Myeloid-Erythroid" layer or Bone Marrow Cell Layer is made up of the erythropoietic series (normoblasts, erythroblasts, etc.), leukopoietic system (mature and young neutrophiles; metamyelocytes, myelocytes, promyelocytes, myeloblasts, etc.) and the megakaryocytic tissue. Lymphocytes, monocytes and a few of the mature polymorphonuclear neutrophiles are present because of unavoidable sinusoidal dilution.

The Fat Layers consist of a pure yellow fat and a red fat. The red fat is formed by meshed bone marrow cells which have been caught when the fat particles move to the top of the hematocrit following centrifugation. Fat may interfere with the proper staining of bone marrow cells and its separation is another advantage of this method. It also gives a relative accurate estimation of the amount of fat in the bone marrow and is of value in the study of certain diseases.

A few diseases in which hypoplasia and hyperplasia of the bone marrow is seen is illustrated in Chart III. This gross quantitative finding is represented by the "Myeloid-erythroid" volume.

Supravital Staining of Bone Marrow Cells. Bone marrow cells (using any of the methods described) are brought in contact with a dye combination consisting of neutral red and Janus Green which has been previously prepared on a clean slide. By this method one studies cells that are alive and physiologically active. It has the disadvantage in that the preparations are not permanent and the finer cytologic structure of the nucleus, which is not stained by these dyes (when the nucleus takes on the stain, the cell is dead) cannot be studied.

Bone Marrow Culture. This method of studying bone marrow cells is still in the experimental stage and is too impractical for routine work.

II. Clinical Pictures Studied.

Bone marrow aspirations were performed in 350 individuals including normal men and women using the concentration method which has been described above. In many cases two or more aspirations were done. The individuals ranged in age from six weeks to seventy-nine years. All material was taken from living patients. Accurate cytological identification is difficult in postmortem material and the changes become more pronounced the longer after death one waits to study bone marrow cells. Heparin was used as the anticoagulant. It is ideal. Oxalates bring about cellular distortion (especially the nucleus) and this may account for the number of unclassified cells recorded by some workers. The conditions studied ranged from anemia to polycythemia; leukopenia to leukemia (counts as high as 800,000 per cu.mm); thrombocytopenia to thrombocytosis, as well as cases presenting lymphadenopathy, splenomegaly, purpura etc. Since this paper deals chiefly with the diagnostic value of sternal marrow aspirations, other hematological studies which were performed on all cases, such as hemoglobin determinations, erythrocytes, leukocytes, platelet and reticulocyte counts, differentials, sedimentation rates (Wintrobe tube) hematocrit determinations and the calculation of the Wintrobe indices etc., have been omitted.

Normal Bone Marrow. The normal differential bone marrow cell count varies depending upon the investigator, the method used, the number of cells counted, the fields selected and the criterion used for cellular classification. The following figures represent the approximate cellular constituents found in the normal marrow according to the technique described.

White blood cells: (Myeloid)

Mature neutrophiles	= 10-25%
Neutrophilic metamyelocytes	= 20-45%
Neutrophilic myelocytes	= 15-20%
Pre-myelocytes and myeloblasts	= 0-5%
Eosinophiles (all types)	= 2-5%
Basophiles are present, but rare	= less 0.5%

Red blood cells: (Erythroid)

Normoblasts	= 75%
Erythroblasts	= 20%
Pro-erythroblasts	= less than 5%

Ratio of white cells to nucleated red cells (myeloid-erythroid ratio) 1.75:1.00 to 3.5:1.

Megakaryocytes mostly adult type are seen scattered throughout the smear (they tend to accumulate at the end of the preparations). The presence of most lymphocytes and monocytes is due to an unavoidable dilution with sinusoidal *blood. Plasma cells, histocytes, recticulum cells* and a few cells that cannot be classified are seen *in all preparations. (Fig. 1, No. 1 and No. 2).* Megaloblasts, the type seen in pernicious anemia *during a relapse, were never seen in normal* bone marrow.

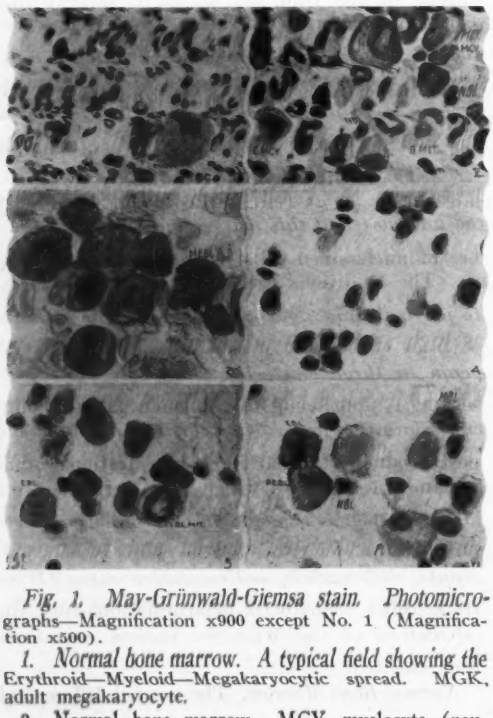

Fig. 1. May-Grünwald-Giemsa stain. Photomicrographs—Magnification x900 except No. 1 (Magnification x500).

1. Normal bone marrow. A typical field showing the Erythroid—Myeloid—Megakaryocytic spread. MGK, adult megakaryocyte.

2. Normal bone marrow. MCY, myelocyte (neutrophilic); MET MCY, two metamyelocytes (neutrophilic); *B MET, band form metamyelocyte (neutrophilic)*; E MCY, eosinophilic metamyelocyte; NBL, normoblast.

3. Megaloblastic cells from a case of pernicious anemia during a severe relapse. PMEBL, promegaloblast; *MEBL, megaloblast; MEBL MIT, megaloblast* in mitosis.

4. Normoblastic reaction 24 hours following liver therapy in a case of pernicious anemia (compare with No. 3, from the same patient before treatment).

5. A case of coeliac disease with a macrocytic anemic showing the Erythroblastic—Normoblastic activity in the bone marrow. EBL, erythroblast; EBL Mit, erythroblast in mitosis.

6. Bone marrow acholuric jaundice (congenital or *acquired type). PEBL, pro-erythroblast; EBL, erythr*oblast; MBL, macronormoblast; NBL, normoblast; PL, plasma cell.

Pernicious Anemia and other Macrocytic Anemias. The bone marrow in pernicious anemia during a severe relapse consists mostly of a marked proliferation of erythropoietic cells of the megaloblastic series. The characteristics of these cells are illustrated in Fig. 1, No. 3. When the erythrocyte count is 2,500,000 per cubic millimeter or less and at times at a level of 3,500,000 per cubic millimeter, the presence of megaloblasts *in the bone marrow is diagnostic of pernicious* anemia. This only holds true in untreated cases. *Complications such as cancer, syphilis, diabetes* mellitus, nephritis, hypothyroidism etc., does not disturb this characteristic bone marrow pattern. A certain amount of myeloid hyperplasia (leukopoiesis) is seen in the bone marrow in all cases and the megakaryocytes are reduced in number. Between 24-48 hours following specific therapy *the bone marrow becomes normoblastic in char*acter. (Fig. 1, No. 4). Thus sternal puncture *can be used as a criterion for the effectiveness of* a liver preparation days before the peripheral blood shows signs of regeneration.

The bone marrow in this disease was followed prior to treatment and every day following liver therapy until the maximum reticulocyte count was reached and then at each million increase in *red count. It is only in this manner that rapid* and significant changes can be detected. The *maturation effect of liver involves not only the* erythroid cells, but also the myeloid elements and megakaryocytes which is reflected in the peripheral blood by an increase in the number of platelets as well as the white count. As the ery*throcytes approach 4,500,000 to 5,000,000 per cu*bic millimeter the bone marrow becomes less *diagnostic qualitatively, although quantitatively* (hematocrit) it may be still hyperplastic.

It cannot be too strongly emphasized that the only criteria of adequate treatment in pernicious anemia is one based on cell size (mean corpuscu*lar volume or Price-Jones Curve) or bone mar*row examination (qualitative or quantitative *determinations). Clinically a patient with this* disease with a red count of 4.5 millions per cubic millimeter may feel well, yet hematologically he may be carrying a macrocytic cell. Such an individual requires more treatment with anti-per*nicious anemia material.*

The macrocytic anemia that occasionally occurs *in cirrhosis of the liver and other hepatic dis*ease was usually associated with a erythroblastic

or normoblastic bone marrow and in some cases the myeloid elements predominated (leukopoiesis). In no case was a megaloblastic marrow seen.

In a case of coeliac disease in an infant the bone marrow was predominating erythroblastic and macro-normoblastic. (Figure 1, No. 5).

In pregnancy and in a few cases of primary aplastic anemia the marrow was normoblastic in character. In the latter disease there was a hyperplasia of the erythroid tissue at the normoblastic level. The total number of erythroblasts and normoblasts equals or exceeds the total number of white cells in the bone marrow differential count. Thus the normal myeloid-erythroid ratio 2.62:1 (average) becomes approximately 1:1.

In some cases of leukemia, especially the acute type, the hyperplasia is myeloid (leukopoiesis) in type and the macrocytic anemia is difficult to explain.

In carcinoma of the stomach with metastasis to the bone marrow in the presence of a severe macrocytic anemia sternal aspiration will immediately rule out pernicious anemia. Occasional cases of sickle-cell anemia, congenital and acquired hemolytic anemia, pellegra, nephritis, carcinomatosis of the bones, acute loss of blood, hepatomegaly of undetermined origin, leukosarcoma (lymphoscarcoma cell leukemia) and malignant neutropenia should offer no difficulty in differentiating from pernicious anemia if the peripheral blood is correlated with the bone marrow findings.

Acholuric Jaundice (Congenital or Acquired Type). The bone marrow was always hyperplastic at the normoblastic stage. (Figure 1, No. 6). Leukopoiesis was also envolved as was shown by the increased number of granulocytes in the marrow. Following splenectomy there was an adjustment which was noted by a decrease in the number of normoblasts. Sternal aspirations in these cases allows a rapid differential diagnosis to be made in conditions presenting chronic jaundice.

Sickle-Cell Anemia. Whether the spleen was intact or had been previously removed the bone marrow showed similar findings. There was a marked hyperplasia of the erythropoietic tissue at the normoblastic stage (depending upon the activity of the disease) with immediate sickling of the red blood cells in the bone marrow aspirated material. This offers a rapid method of demonstratinng sickling.

Hypochromic Anemias. The bone marrow in the microcytic hypochromic anemias showed a hyperplastic normoblastic reaction. Irrespective of the cause, whether it was due to chronic loss of blood (peptic ulcer, hemorrhoids, uterine bleeding, malignancy etc.) or the "idiopathic" type the bone marrow revealed the same findings, with one exception. This was in cases of carcinomatosis of the bones. Here the bone marrow contained carcinoma cells (?) or reticulum (?) or primitive cells (?). These cells were very fragile and remained in groups or clumps. In some of these cases the histocytes showed signs of phagocytic activity and the megakaryocytes were increased in number.

Leukemia. In the various types of leukemia bone marrow aspiration is mainly corroborative and usually mirrors the changes in the peripheral blood. The only exception is in cases of acute leukemia in a leukopenic phase (aleukemic). Here the bone marrow is overrun by large numbers of "blast" cells with an almost complete disappearance of nucleated red cells and megakaryocytes. This is the triad—anemia, leukopenia and thrombopenia. Such cases may be wrongly diagnosed Banti's disease, pernicious anemia, "purpura hemorrhagica" or agranulocytosis. It is in the differential diagnosis of these conditions that the importance of sternal marrow aspiration has shown its value.

Chart 3

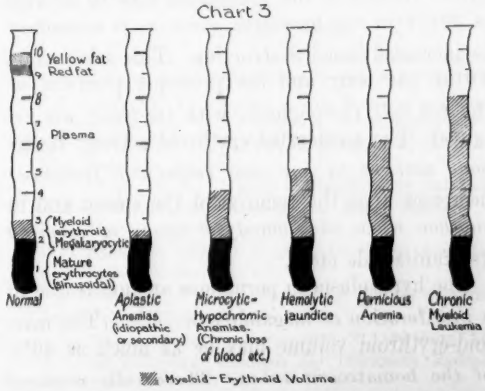

Chart III. This diagram illustrates a few diseases in which hypoplasia and hyperplasia of the bone marrow is seen. These gross quantitative findings are represented by the myeloid-erythroid volume in the hematocrit tubes.

In chart III it will be noted that in the aplastic anemias the volume of functioning bone mar-

row cells is decreased. This is represented by the myeloid-erythroid volume in the hematocrit tube, (1.5-3.0% compared with the normal of 5-8%). On the other hand the total number of nucleated red cells in the differential bone marrow cell count is equal to the combined number of white cells. Thus the normal white to red cell ratio 2.62:1 (average) becomes approximately 1:1. This is a hyperplasia of the erythroid tissue at the normoblastic level, although the total amount (volume) of functioning marrow is reduced. The anemia in the idiopathic type does not respond to any form of therapy and blood transfusions are of temporary use.

In the microcytic hypochromic anemias there is a myeloid-erythroid hyperplasia (20% or more) predominatingly erythroblastic-normoblastic in type. The peripheral blood reveals a small red blood cell (microcytic) with a decrease in the amount of hemoglobin in the average erythrocyte (hypochromic). The bone marrow despite the anemia is hyperplastic, the red blood cells being unable to mature properly unless large doses of iron are given. Chronic loss of blood with its loss of iron (peptic ulcers, malignancies etc.) is usually responsible for this iron deficiency anemia. Following the replacement of iron therapeutically the hyperplasia in the bone marrow returns to normal and the red blood cells become normal in size and in hemoglobin content.

The marked hyperplasia (the myeloid erythroid volume in the hematocrit may be as high as 30%) in the hemolytic anemias is secondary to increased blood destruction. This takes place within the body and the principle products of the red cell (hemoglobin with its iron) are retained. The accelerated erythroid activity in the bone marrow in one case (acholuric jaundice) decreases upon the removal of the spleen and in another when the hemolytic agent is removed (sulfanilamide etc.).

The hyperplasia in pernicious anemia is due to a proliferation of megaloblastic cells. (The myeloid-erythroid volume may be as much as 40% of the hematrocrit tube). These cells required some form of anti-pernicious anemia principle for their maturation and probably for their suppression in order that the normal erythroid tissue may function. This is reflected in the peripheral blood by a decrease in the average red cell volume from 100 cubic microns or more (macrocytic) to an average red cell volume of 86 cubic microns (normocytic). The myeloid-erythroid volume then approaches normal.

In chronic myeloid leukemia there is an uncontrolled hyperplasia of the normal myeloid cells which is reflected in the peripheral blood by an increase in the leukocyte count. The myeloid-erythroid volume which consists mostly of proliferating white cells (myelocytes, myeloblasts etc.) interferes with the normal growth of red blood cells and usually of the megakaryocytes. (Myeloid-erythroid volumes as high as 75% have been found). Following treatment with x-ray the decrease in the white count is associated with a reduction in the amount of myeloid tissue in the bone marrow.

In a case of acute leukemia with a low white count in a child the marrow showed a normoblastic reaction and a slight reduction in the number of megakaryocytes, yet the granulopoietic tissue was practically replaced by "blast" and "lymphoid-like" cells. (Fig. 2. No. 2).

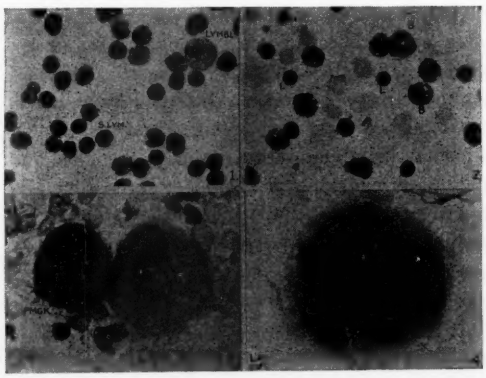

Fig. 2. May-Grünwald-Giemsa stain. Photomicrographs—Magnification x900.
1. Bone marrow in chronic lymphatic leukemia showing the normal marrow cells replaced by lymphocytes. S. L Y M, small lymphocytes; LYMBL, lymphoblast.
2. Bone marrow from a case of "aleukemic" leukemia in an infant. B, "blasts" cells; L, "lymhoid-like" cells (undifferentiated?). Compare these cells ("lymphoid") with those of Fig. 1, No. 4 (normoblasts) and with those of Fig. 2, No. 1 (small lymphocytes).
3. Megakaryocytes from a case of essential thrombocytopenic purpura. PMGK, promegakaryocyte; YMGK, young megakaryocyte.
4. Adult megakaryocyte from normal bone marrow.

Essential Thrombocytopenic Purpura. In patients with this disease, the examination of the bone marrow showed a normal or increased number of megakaryocytes, although the platelets were reduced or absent in the peripheral blood.

This finding in the bone marow was similar during the active phase of the disease and during a temporary remission induced by blood transfusions. The predominating type of megakaryocytes seen is illustrated in Fig. 2, No. 3 (progmegakaryocte and young form). Compare these cells with the adult type seen in normal bone marrow (Fig. 2, No. 4).

It is in the differential of this disease from aplastic anemia, toxic processes etc., that the study of the bone marrow is essential before a diagnosis and any form of therapy can be suggested.

Lymphadenopathy and Splenomegaly. If the bone marrow findings are correlated with the peripheral blood studies many conditions presenting lymphadenopathy, splenomegaly or both may be diagnosed or definite disease processes ruled out.

Some cases of Hodgkin's diseases are associated with a myeloid hyperplasia, an increase in the number of plasma cells, histocytes and megakaryocytes. If repeated bone marrow studies reveal similar findings, this may prove of diagnostic importance.

DISCUSSION

At the beginning of this study bone marrow biopsy was resorted to in many conditions whether or not a hematologic problem presented itself. In several instances the biopsies were repeated. This method was soon discarded in favor of sternal marrow aspirations. Smears made of the aspirated material with few exceptions were found qualitatively to be nearly identical with those made from biopsies. The method is simple, harmless and less painful than a surgical biopsy. No training or special permission is required. The diagnosis is available immediately and repeated punctures may be readily and easily done. If the technique for the concentration of bone marrow is followed sternal aspiration will make the diagnosis in any case that biopsy does.

Loss of histological structure and admixture of sinusoidal blood with marrow cells are the disadvantages of sternal aspiration. These disadvantages are outweighed by the advantages of the technique of bone marrow concentration already discussed.

If one fails to aspirate marrow in one area because of the presence of fibrosis other points on the sternum should be tried. Also if the aspirated material is mostly sinusoidal in character and contains very few bone marrow cells, the procedure should be repeated elsewhere on the sternum. Biopsy can always be done as the last resort.

It should be emphasized that sternal marrow aspiration is not a "solve all" procedure (this is also true of biopsies). Not all obscure hematology cases can be diagnosed by means of bone marrow study. Mistakes are inevitable. Accurate interpretation and diagnosis of disease processes is acquired through personal and continued experience with many varieties of conditions, both clinical and hematological. It is only in this way that a better understanding of the physiologic pathology of various disorders of the blood-forming organs can be approached.

CONCLUSIONS

1. All methods in general use in the study of bone marrow are reviewed. Their diagnostic value, indications and limitations are discussed.

2. The concentration technique of obtaining and studying bone marrow material is described in detail and its advantages over other methods in general use is considered.

3. 350 cases were studied. The bone marrow findings in a group of clinical conditions are briefly discussed and the diagnostic, prognostic, and corroborative value considered.

4. The ease with which sternal marrow may be obtained and the diagnostic and prognostic value that it offers suggests sternal puncture as a routine hematologic procedure.

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A SCARLET FEVER SURVEY

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Cultures of the nose and throat for hemolytic streptococci and Dick tests were made on all children admitted to The Children's Memorial Hospital during 1934 and 1935. Similar cultures were taken on all the personnel, and Dick tests were made before employment. Cultures were also taken and Dick tests performed on the whole hospital personnel at the beginning of the study. Cultures were repeated on the whole group on several occasions thereafter. Repeated cultures were often made on those individuals having a positive culture. Repeated Dick tests were done on groups of children with and without positive cultures. A record was kept as to whether the tonsils had been removed and as to whether a throat infection was present at the time of culture. When a case of scarlet fever occurred in a hospital patient all possible contacts were cultured. All cases of scarlet fever occurring in the city of Chicago were reviewed for the two years this study was in progress. An attempt was made to trace all secondary cases which occurred in a family after a primary case. All cultures were made of the nose and throat by the usual blood agar plate method.

CULTURES FOR HEMOLYTIC STREPTOCOCCI

In Table I are given the results of some of the culture surveys on hospital personnel and children resident in the hospital. Cultures were made on the personnel of a general hospital to serve as a control group with the children's hospital personnel group. The frequency of positive cultures was only three percent greater in the latter group than in the general hospital personnel group although scarlet fever and upper respiratory infections are more common in children than in adults. On all culture surveys of the children's hospital personnel the percentage of positive cultures remained constant with seasonal variations between 11.4% and 17.7%. Cultures of the personnel taken before employment were positive in only 4.2%. After employ-

*Deceased.

From the Otho S. A. Sprague Memorial Institute and The Children's Memorial Hospital. Read before Section on Public Health and Hygiene of Illinois State Medical Society, May 17, 1938, Springfield.

ment there was immediately an increase in the frequency of positive cultures to approximately 17%.

The culture survey made on the patients resident in the children's hospital in January of 1934 showed 44.5% having positive cultures. This was at a time when many sporadic cases of scarlet fever were occurring in the hospital in both patients and personnel. On many subsequent similar surveys the number with positive cultures was always about 25%. This is considerably higher than the number with positive cultures at the time of hospital admission which over a two-year period averaged 19.2%. This increase can undoubtedly be explained by the continuous contact between sick patients and personnel caring for the sick.

In Table I the results of culture on the same group of personnel and patients on successive days are also given. Approximately the same number of positive cultures was present on both days. But when the individuals with positive cultures are compared for each day it was found that from 50 to 70% were positive both days. For example, 196 of the personnel were cultured on both December 19 and 20, with 32 or 17% and 34 or 17.7% positive respectively. Of those with positive cultures only 24 were positive both days while eight were positive the first day and negative the next, and ten were negative the first day but positive the second day. This same variation occurred when patients were cultured on successive days. From this it seems that too much reliance cannot be placed on a negative or positive culture on any one day when considering carriers of the hemolytic streptococcus.

Nose and throat cultures for hemolytic streptococci were taken on 4,151 children admitted as patients to The Children's Memorial Hospital during 1934, 1935 and the early months of 1936. Cultures insofar as possible were taken on the day of admission and never later than the following morning. There was practically no difference in the frequency of positive cultures for both years, the figures being 18.9% and 19.2%. The incidence of positive cultures by months is given in the last two columns of Table 2. In both years the latter half of the winter months and the spring months had the highest frequency. In the last column of Table 3 the incidence of positive cultures according to age is given. Positive cultures were less likely to be present in infants than in older children. There was a gradual increase up to the fourth year of age aftter which the incidence remained about the same. When the children of 3,700 families were grouped as to the number of members in each family, it was found that the size of the family had no influence upon the presence or absence of a positive culture. Children from large families were no more likely to have positive cultures than children from small families.

The relation of a positive culture to the presence or absence of the tonsils and adenoids and its relation to throat infections are given in Table 4. Information bearing on these points was obtained on 3,270 children who had cultures upon admission to the hospital. When a throat infection was present positive cultures were 6% more frequent in the non-tonsillectomized than in the tonsillectomized group. When no throat infection was present positive cultures were only 3% more frequent in the non-tonsillectomized group. It seems that the presence of tonsils and adenoids has a greater influence upon the presence of hemolytic streptococci in the nose and throat than the presence of a throat infection in children. Of a group of 832 children that were admitted for only tonsillectomy and adenoidectomy 24% had positive cultures which

TABLE 1. RESULTS OF NOSE AND THROAT CULTURES FOR HEMOLYTIC STREPTOCOCCI ON HOSPITAL PERSONNEL AND PATIENTS

	Personnel general hospital	Personnel children hospital						Patients Children's hospital		
		Identical Group			Identical Group*	Identical Group			Identical Group	
Dates	1934	1935		1934	1935	1935		1934	1936	
	1/7	1/24	1/25	1/24 7/20	1/17 1/18	12/19	12/20	1/7	9/3	9/4
Number Cultured	150	133	133	383 306	323 194	186	186	124	115	115
Positive Cultures	21	16	12	65 35	48 14	32	34	55	29	28
Per Cent Positive.....	14%	12%	9.1%	17% 11.4%	14.9% 7%*	17%	17.7%	44.5%	25%	24%

*Personnel cultured on 1/18/35 had all had negative cultures on 1/17/35.

emphasizes how little influence throat infections have upon the presence of positive hemolytic streptococcic cultures. But this does not seeem to hold true for adults. 630 of the personnel had nose and throat cultures taken when they were ill with upper respiratory infections. A positive culture was present in 24% which is a definite increase over the 17% with positive cultures of the personnel when on duty.

Both the nose and throat were always cultured. The frequency of positive nose cultures and positive throat cultures is given in Table 4. The nose alone was positive in only 1.5% of the patients, the nose and throat together in only 3% and the throat alone in 14.5%. The nose seems to be of relatively little importance when carriers of hemolytic streptococci are being considered.

The frequency of positive cultures was increased in the nurses who cared for patients with contagious diseases. Before going on duty in the contagious unit of the hosptal 14% of 92 nurses had positive cultures while at the end of that service 24% had positive cultures.

DICK TESTS

Dick tests were performed on 3,710 children admitted to the children's hospital. In the second to last column of Table III the frequency of positive Dick reactions in the various age groups is given. There was a gradual decrease in the number of positive Dick reactors from a high of 71% in the one-year age group to 28% in the 12-year-old group. While only 34% of the infants under one year of age had positive tests it was found that the Dick reaction was very unstable at this age, changing from negative to positive and vice-versa very frequently. Positive Dick reactions were 11% more frequent in non-tonsillectomized children than in children that had had their tonsils and adenoids removed. As stated previously, 3% fewer of the tonsillectomized children had nose and throat cultures positive for hemolytic streptococci than the non-tonsillectomized group. It would seem from this that the dictum of advising tonsillectomy at an early age to prevent scarlet fever is not sound.

859 children had a re-check of their Dick test within one year of the first test. Of those over two years of age in whom the original Dick reacton was negative 1% were found to have positive reactions upon the second test. When first tested 181 children with positive Dick reactions also had nose and throat cultures positive for hemolytic streptococci. On the second Dick test 18.2% of these 181 children had become Dick negative. Of 429 children with a positive Dick test but with a negative culture when first tested, 11.9% became Dick negative on the second test. In the presence of a positive throat culture 6% more positive Dick reactors became negative than when a negative throat culture was present.

To determine whether the children of a large family were more likely to have a negative Dick reaction than those of a small family, the children of 3,729 families were grouped according to the number of members in each family. There was a definite gradual decrease in the number of positive Dick reactors with increase in family size. From a three-member family 54% of the patients had a positive Dick reaction which decreased to 32% for the families of more than ten members.

A history of scarlet fever within the preceding five years was obtained in 559 children. At the time of their scarlet fever 329 of the children were quarantined at home and 167 were removed to a contagious hospital. Of those quarantined at home 23% still had a positive Dick reaction and of those quarantined in a contagious hospital 13% were still Dick positive. When these children were divided into age groups, it was found that of those with a history of scarlet fever before the third year of age 48% of the home-quarantined group and 40% of the hospital-quarantined group still had positive Dick reactions as compared to 17% and 11% respectively of the children between three and twelve years of age. A higher number of children continued to have a positive Dick reaction after home quarantine than hospital quarantine which is undoubtedly due to a more liberal diagnosis in home cases. There is a fairly high incidence of failure of immunity as measured by the Dick test (after the disease). This is in contrast to most other contagious diseases.

That the information received from the interpretation of the Dick test is not always reliable seemed evident from the fact that eight cases of scarlet fever developed in individuals in whom the Dick reaction had been read as negative. Further, positive Dick reactions were present in

16 personnel, all of whom gave a history of a previously negative test.

SCARLET FEVER

From September, 1933 to June, 1936, scarlet fever was diagnosed in 76 patients and six of the personnel in the children's hospital. Four of the patients had a surgical scarlet fever with negative throat cultures but positive wound cultures. It was felt that 17 of the patients had the disease or had been infected before hospital admission. The other 59 patients and the six personnel developed the disease after hospitalization. In only 13 of these latter 65 cases could exposure or possible contact be traced to a case of scarlet fever. In other words, infection must have taken place from contact with patients or personnnel with positive hemolytic streptococci cultures some of whom were carriers of scarlet fever strains. The control of scarlet fever in a hospital is a complex problem, because there is no simple method of differentiating a scarlet fever strain from other strains of the organism. 14% to 17% of the personnel always have positive cultures, while 12 to 30% of the children admitted to the hospital also have positive cultures. After residence in the hospital the incidence of positive cultures rises to 25% to 45%. Too, only 50% to 70% of the individuals with positive cultures are positive on successive days.

There were 245 children with some contact with 40 cases of scarlet fever in The Children's Memorial Hospital. Of these 245, positive Dick tests were present in 89. Scarlet fever developed in four of the 89 from this known exposure and in five more at a later date with no known exposure. 125 children with definite exposures to cases of scarlet fever were cultured at the time of exposure and 36% were found to have positive cultures. On admission only 19% of them had positive cultures.

The Chicago Health Department records of the reported cases of scarlet fever were studied for 1934 and 1935. During 1934 and until May of 1935 the quarantine period was three weeks and from this time on the period was raised to four weeks. In 1934 there were 9,453 cases of scarlet fever reported, in 1935 the number was 15,989, and in 1936 it decreased to 7,918 cases.

In Table 2 the monthly distribution of cases is given. The winter and spring months consistently show the highest incidence of cases. With the establishment of the four-week quarantine period in May, 1935 there was a marked decrease in the frequency of the disease so that there were fewer cases in 1936 than in 1934. It can be questioned whether the lengthening of the quarantine alone brought about a decrease in frequency of the disease. It is possible the epidemic itself was receding due to natural causes. The percentage of individuals with positive cultures and positive Dick tests remained the same during both years. Also, as will be shown later, the slight decrease of traceable secondary cases started before the quarantine period was increased. As can be seen in Table 2 the monthly incidence of cultures positive for hemolytic streptococci follows quite closely the monthly incidence of the disease. The frequency of positive cultures, though, does not decrease as much during the summer months as does the frequency of scarlet fever.

TABLE 2. MONTHLY INCIDENCE OF SCARLET FEVER AND POSITIVE CULTURES

	1934		1935		1934	1935
Month	No. Cases	Per Cent	No. Cases	Per Cent	Pos. Cult.	Pos. Cult.
Jan.	915	9.7	1531	9.6	17.9	16.7
Feb.	1059	11.2	2176	13.6	24.1	21.9
March	1193	12.6	2842	17.8	25.6	30.3
April	1094	11.6	2930	18.3	24.9	27.7
May	1119	11.8	*2630	16.4	25.9	23.4
June	661	7.0	1480	9.3	18.1	26.2
July	228	2.4	341	2.1	16.9	12.3
Aug.	160	1.7	166	1.0	12.7	15.7
Sept.	318	3.4	209	1.3	11.0	13.4
Oct.	577	6.1	457	2.9	18.0	15.0
Nov.	923	9.8	720	4.5	17.5	12.5
Dec.	1193	12.6	505	3.2	17.3	16.7
	9453		15989		7918 in 1936	

*Four-week quarantine period starts.

In Table 3 the age incidence of scarlet fever is given as well as the age incidence of positive Dick tests and positive cultures. Again, the curve of positive cultures follows to some extent the curve for scarlet fever except that there is not the sharp rise to the seventh year and the rapid fall thereafter as in scarlet fever. The age incidence of positive Dick tests in no way follows the age incidence of scarlet fever. This is undoubtedly due to the fewer possible contacts in the young age groups when susceptibility as measured by the Dick test is most frequently present.

When the number of days the patients were ill before a diagnosis of scarlet fever was reported to the Health Department was estimated, it was found that about 75% of the patients had been ill for from three to five days, 25% being reported on the third day. From the record this meant that the physician had been called on that day. Because of this delay in diagnosis the other members of the household had ample time for exposure before quarantine could be established.

TABLE 3. INCIDENCE ACCORDING TO AGE

Age	Scarlet Fever Cases	Per Cent	% Pos. Dick	% Pos. Cult.
Under 1 yr.	80	.3	34	11
1	361	1.4	71	15
2	1100	4.3	75	21
3	1515	6.0	69	17
4	1868	7.3	61	24
5	2293	9.0	54	24
6	3264	12.9	48	25
7	2961	11.6	41	26
8	2400	9.5	41	19
9	1790	7.0	32	24
10	1507	5.9	34	32
11	1128	4.4	27	20
12	917	3.6	28	18

TABLE 4. RELATION OF POSITIVE CULTURES IN PATIENTS TO TONSILLECTOMY

	Tonsils Present		Tonsils Removed	
	No.	Pos.	No.	Pos.
Patients with U. R. I.	1002	23%	157	17%
Patients without U. R. I.	1845	20%	266	17%

832 patients admitted for tonsillectomy
24% positive cultures

Nose alone positive	1.5%
Nose and throat both positive	3.0%
Throat alone positive	14.5%

We designated as a primary case of scarlet fever the first case in the home and as secondary any subsequent case in that home which occurred within seven days of the last possible contact. This should serve in a rough way as a measure of the contagiousness of the disease and the infectivity of the infecting organism in relation to producing the disease. The secondary cases have been divided into the following groups depending upon the time of onset in relation to the primary case. In group I were placed all those secondary cases that developed before quarantine was established as well as those cases which developed within seven days after quarantine was supposed to have been established. The establishment of quarantine in the home or the removal of the primary case to a contagious hospital would not affect the secondary cases placed in this group because exposure to the disease had already taken place. In Table V all the secondary cases in group I have been listed according to the day of onset as reckoned from the first possible day of exposure. The figures for 1934 and 1935 have been combined because they were so similar for both years and because the length of the quarantine period would not affect this group. Of the total cases reported for both years, 10.3% were secondary cases falling in this group in which exposure took place before quarantine was established. Not included in these figures are 1,843 cases occurring in 839 families in which the same date of onset was given. Assuming that one case in each of these families was a primary case then the other 1,004 cases could be considered as secondary. When these are added to the other secondary cases there are 3,383 or 14.6% secondary cases in group I. The figures for 1934 were 14.8% and for 1935 13%.

In group 2 in Table 5 were placed all secondary cases that developed in the family after the first week of home quarantine. This group includes only cases after the first week of quarantine because those secondary cases occurring before that time might reasonably have become infected before quarantine was established. In the table the cases have been divided according to both the three and the four-week quarantine periods. During the three-week quarantine periods 4.1% and 4% of the home-quarantined cases were considered as secondary, compared to 3.5% during the four-week period. The number of secondary cases decreased gradually from week to week. To account for so many secondary cases during home quarantine there must be considerable exposure to the scarlet fever patient, or to such possible carriers of the infecting organism as the mother who is usually the one to care for the patient. Most susceptibles seem to become infected during the early weeks of quarantine which would account for the fact that there is no comparable rise in secondary cases the week after quarantine is discontinued. This is in contrast to what happens in the hospital-quarantined group as will be shown.

In group 3 in Table 5 were included all secondary cases that developed in the family when

the primary case was sent to a contagious hospital. Only cases developing after the first week were included for the same reasons as given for group 2. Some secondary cases developed in the home the second week after quarantine because often the primary case was not hospitalized at the beginning of quarantine and then the same conditions would prevail as in the succeeding group. During the three-week quarantine periods 7% and 6.5% of the hospital-quarantined cases were considered secondary and 5.9% during the four-week period. In this group there was a marked increase in secondary cases arising in the home immediately after termination of hospital quarantine and return of the primary case to the home. This was true for both the three and the four-week quarantine periods. There were more secondary cases arising in the home from hospital-quarantined cases than from cases quarantined at home. This is undoubtedly due to the fact that carriers of the infecting hemolytic streptococcus are more prone to occur in hospitals.

Grouping together all the secondary cases it was found that in 1934 20% and in 1935 17.3% of the reported cases could be considered as secondary arising in the home from exposures to a primary case. What number of secondary cases develop outside the home cannot be estimated. Approximately 74% of the secondary cases had their exposure before quarantine was established. Quarantine as now carried out is far from adequate and the present methods of control of scarlet fever leave much to be desired.

In this study it was found that the number of hemolytic streptococcus carriers did not vary from year to year. Positive cultures were only slightly more frequent in children with throat infections than in children with normal-appearing throats. The incidence of positive Dick reactors remained the same for both years. The number of cases of scarlet fever per infected family and the number of traceable secondary cases in the home remained approximately the same for both years although there were 60% more cases of scarlet fever reported the second

TABLE 5. TIME OF ONSET OF SECONDARY CASES OF SCARLET FEVER AFTER EXPOSURE

Group 1. Exposures before Quarantine was Established

1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days	8 Days	9 Days	10 Days	Over 10 Days	Total	Total Reported Cases
212	266	240	276	201	219	228	178	98	114	347	2379	23056‡
8.9	11.2	10.1	11.6	8.4	9.2	9.6	7.5	4.1	4.8	14.5	10.3	per cent

Group 2. Home Quarantine Exposures

	2nd week	3rd week	4th week	5th week	6th week	7th week	8th week	Over 8 weeks	Total	Total Quarantined at home
Three-week Quarantine Period, 1934.....	37.2	18.3	9.9	11.8	6.1	5.3	1.5	9.9	4.1	per cent
								26	237*	5799
Three-week Quarantine Period Jan.-May, 1935.	44.9	22.7	10.1	10.0	4.5	4.9	3.1	3.7	4.0	per cent
								12	309*	7722
Four-week Quarantine Period May-Dec., 1935.	30.1	18.0	10.8	19.3	12.0	6.6	3.0	9.8	3.5	per cent
								18	166*	4742

Group 3. Hospital Quarantine Exposures

										Total Quarantined in Hospital
1934	10.3	6.2	24.8	30.6	16.1	7.4	5.0	13.0	7.0	per cent
								36	242*	3439
								9	118*	1809
Jan.-May 1935	10.2	13.4	29.7	17.0	13.4	11.0	5.0	7.1	6.5	per cent
								22	93*	1584
May-Dec. 1935	4.3	14.0	9.7	23.7	31.0	10.8	6.5	18.1	5.9	per cent

‡1843 Cases Reported as Same Day of Onset Not Included.
*Cases Occurring After the Eighth Week Not Included in Totals.

That the decrease in secondary cases was not entirely due to the increase in the quarantine period seems evident from the fact that the number of traceable secondary cases was already decreasing during the early months of 1935 when the three-week period was still in force. In Table 5 the number of cases occurring in families more than eight weeks after the primary case is also given. There were few of these cases and it seems as though fewer susceptibles were left to develop the disease during the balance of the year.

It would seem that the increase in scarlet fever is really not due to an increase in the infectivity of the infecting organism (contagiousness of the disease) as much as to a higher proportion of scarlet fever strains of the hemolytic streptococcus during certain years.

DISCUSSION

Dr. Martin H. Seifert, Wilmette: This beautiful piece of work on scarlet seems quite significant in many ways. This last statement about the difficulty, of course, of differentiating the hemolytic streptococci that will cause scarlet fever by any simple cultural

methods is obvious. On the other hand, I read just the other day a very interesting article of Bailey in his recent survey in Illinois on hemolytic streptococci in grammar school children in an attempt to determine the number of organisms or the percentage of positive throats that are capable of producing scarlet. He felt that 90 per cent. of the hemolytic streptococci found in cultures from the throats of these children were demonstrated to be strains that were capable of producing scarlet fever; that 90 per cent. of those organisms produced toxins which neutralized the commercial anti-toxins on the American market. So, maybe after all, it is not so far-fetched to think that most of these hemolytic streptococci that are recovered from throats are capable of producing scarlet fever and at times perhaps do produce it. That is borne out in my work where we have picked up frequently, positive throats in individuals who were apparently perfectly well, and yet those individuals may be isolated with positive throats for as much as thirty-five days and finally develop scarlet fever at home.

His 17 per cent. positive cultures on the personnel and 4.2 positives of new personnel coming in was interesting to me in that I have consistently objected to the fact that so much of the work in determining the incidence of hemolytic streptococci in normal throats has been done on hospital inhabitants, which seems to me fairly worthless from the standpoint of normal incidence, and here again that is displayed. He had only about one-fourth of the incidence with new people just coming in contact with hospital patients that he had with people who had been residents of the hospital or worked in the hospital for some time.

Then, there is another thing that strikes me, and that is in many cases apparently there was one culture taken. I believe that will explain some of the discrepancies Dr. Bigler had a little difficulty with, and the same way with changes from positives to negatives and negatives to positives on two successive days. I do not believe that that means that the organisms were not there on one day and were there on the other. With the taking of food or drink or the gargling with this and the other thing, they are killed between the time they leave the throat and the time they get on the culture plate. And, if you don't happen to get a positive culture on one occasion I don't believe it means that they are not there. I think, very often, if these cultures were repeated three or four times you will get them most of the time, at least, in these throats.

CLASS DIFFERENCES SHOW IN BIRTH RATE

College trained men and women are frequently reproached for their responsibility for the failing birth rate. According to a recent survey, professional groups do better by the country than the business class.

This study was conducted in 5 large cities, and included 16,831 married women. Standardized birth rates were lowest in the $2,000 to $3,000 family income class. Higher income families had more children, so did those under $2,000. Of all groups, however, the reliefers were most prolific.—*Hospital Topics.*

ACUTE LARYNGITIS IN INFANTS

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Acute laryngitis in infants is an inflammatory disease of the laryngeal intima, usually secondary to an acute upper respiratory infection, and generally associated with pathological changes in the lower respiratory tract. Its frequent severity, the peculiar regional anatomy, both microscopical and gross, the seemingly relative lack of immunity—here all combine to make this entity a pertinent pediatric problem. Jackson[1] for purposes herein divides acute inflammations of the larynx, per se, into (a) specific acute laryngitis; (b) nonspecific acute laryngitis. Acute specific laryngitis is an infective disease with a definite course and a self-limited termination. Different organisms produce the same clinical features, course and termination in this entity. Acute nonspecific laryngitis is due to causes other than specific infection, and does not follow a regular course.

It is the more severe, specific type of laryngitis with peculiarities incident to the infant that we are here concerned with. Questioningly one asks, "Why are these infants so severely ill, and what is the reason for their marked respiratory distress?"

Fig. 237.—Normal anatomy of the larynx (in the infant).

Fig. 238.—Normal anatomy of the larynx (in the child).

Photograph 1. "Comparison of Infant and Child Larynx." (By V. E. Negus.) From "Diseases of the Nose and Throat," by Sir St. Clair Thompson, p. 495.

Anatomically the infant larynx is a peculiar structure. It is at term usually at the level of

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the fourth cervical vertebra. As the child develops it descends until it reaches the sixth cervical at which level it is present in the adult.[2] Descent is gradual and is greater in the female than the male. The entrance of the infantile larynx is at much more of an acute angle, looking from behind, forward and down, than in the adult. As the child grows, the anterior-posterior cephalic lengthening permits the vertical portion of the tongue to carry the epiglottis forward. The larynx now assumes a more vertical position and lays more directly above the glottis and dependent trachea. The infantile epiglottis is narrow, tends to curve upon itself, causing the lateral borders to approach each other closer posteriorally. This permits the aryepiglottic folds to elevate themselves and diminishes the inlet of the larynx, making it smaller relative to the other laryngeal measurements. The anteroposterior dimensions of the glottis and subglottis are smaller, the latter being considerably less than the trachea.[2] The narrowest laryngeal dimension is in the subglottic zone. This area is surrounded by the only complete ring in the respiratory tract, and therefore any swelling here is at the expense of the lumen, be it caused by inflammation, infection or trauma. Tucker[2] states a subglottic measurement of six mm. or above may be considered normal, while a five mm. dimension, though small, is compatable with life. A measurement of four mm. he considers a stenosis, either congenital or acquired. One must remember, too, that the soft texture and compressability of the cartilages make for potentially smaller measurements, except for the subglottic region.

Histologically the mucosa varies in structure and thickness in different parts of the larynx. Many acinous glands are present in the thickened mucosal folds over the pharyngeal surface of the larynx, the ventricular bands and in the ventricles themselves. They are scant or absent, however, in the cords where the mucosa is thin stratified squamous epithelium and is closely bound down. Stratified pavement epithelium also covers the upper ventral one-half, and the whole posterior epiglottic surfaces extending down over the anterosuperior portion of the aryepiglottic folds. Pseudostratified columnar ciliated epithelium is found everywhere else.[4] In infants the laryngeal tissue is very loose and especially is this true in the subglottic region where a large amount of delicate areolar tissue abounds. The lymphatic vascularity is much greater in infants where the submucosa too, participates in the exudative swelling. The cords being lymphatic free, communication via the lymphatics above and below the cords is effected through the posterior laryngeal wall.[3] This rich vascular areolar, almost spongy tissue permits a rapid inflow of serum, greatest in the subglottic region.

Bacteriology. Diptheria was here ruled out before admission. Bacterial investigation proved of little value to us, only one case yielding a positive culture. The organisms apparently had either been rendered avirulent or had invaded the loose deeper tissue structure. Johnson[5] believes that a mixed infection is present, while Platou,[6] in the Kleb-Loeffler negative cases, found hemolytic streptococcus predominating. We believe this organism to be initially present. However, skin tests for hemolytic streptococcus and Dick tests, as done routinely by the late Dr. Silber Peacock, were all negative. When we come to name the bacteria that are responsible for infectious laryngitis, Jackson[1] writes, "We are immediately confronted with the shortcomings of bacteriology as it exists today."

There can be no question but what organisms that are morphologically and culturally identical may be really different organisms, these differences being regarded as "strains." A number of different and very distinct types of organisms can produce suppuration and these are called pyogenic bacteria. A parallel fact is that the same laryngoscopic appearances and clinical features can be produced by entirely different organisms. Jackson lists streptococcus hemolyticus, streptococcus viridans, staphlococcus albus, staphlococcus aureus, pneumococci of different types, micrococcus catarrhalis, B. Influenzae, bacillius diptheria (in patients without diphtheria) as most frequently found here. So we see, that this disease can be produced by different organisms, and that possibly, in some cases, the organisms found may be secondary invaders and be responsible for marked mucosal damage, as pointed out by Farber.[7]

Pathologically the stages seen here are with modifications those seen in the nose and nasopharynx. There is an incubation period secondary to the primary upper respiratory infection, an initial ischemia followed by active and later

passive hyperemia. Glandular elements are relatively scarce here and secretion is consequently not abundant. When it is profuse it comes more from tracheobronchial involvement. The inflammatory exudate, initially absent, is, in the second stage, composed of mucus and epithelial debris, and lastly purulent with increase in the leukocytes and lymphocytes. Early edema accompanying the hyperemia is red, while later it takes on its characteristic pallor. It is noticeable in the loose mucosal folds, but stands out in the subglottic region where, coupled with the inflammatory exudate, it tends to plug up this area, causing obstructive dyspnea.

During the last ten years (1927-1937) thirty-six cases of acute laryngitis have been admitted to the Cribside Service. Of this number, fourteen came in during the winter of 1933-34 and constitute the basis for this report. Some were from orphanages; others from itinerant homes. Most were quite well nourished, but many had been sustained upon deficient diet with a resultant lowering of their immunity.

Immunity is an important factor in these infants. Where the larynx is host to an initial severe acute infection a very serious pathological state occurs. Having had no previous attacks there is little or no relative immunity and a maximum of soft tissue reaction occurs. Vitamin deficiency is undoubtedly one of the basic predisposing factors here. Jackson[1] avers that an excess of vitamins has proven itself clinically to be a powerful immunizing factor. In the temperate zone here, the wide fluctuation of temperature out-of-doors, the marked discrepancy between indoor and outdoor thermal readings are conducive to respiratory insult. Other contributing factors are excessively heated homes with resultant moisture diminution, less daily intake of green food and fruits, less fluid consumption, less sunlight exposure. Excessive clothing, obviating proper skin function and skin tone, is to be condemned!

SYMPTOMS

The majority of these infants are actually ill with a fever of 103° to 104°, F. (rectal reading). Usually an associated rhinopharyngitis (ten of the fourteen) is present. Pulse is rapid; respiratory distress most prominent. Hoarseness appears early, preceded or followed by a cough; only one child here had aphonia. Respiratory rate varied from 24 to 68. Croupy cough, denoting subglottic obstruction, was present in four cases, stridor in nine, and suprasternal retraction in ten infants. Tucker[8] attributes this marked suprasternal retraction to the trapdoor action of the vocal cords. The ventricle floor is higher at the margin of the cord than it is laterally. Inspiration has a tendancy to pull the cords together, narowing the rima of the glottis.

ACUTE LARYNGITIS IN INFANTS

14 CASES—1933-34

						SYMPTOMS AND SIGNS														TREATMENT				REMARKS
						Irritative				Obstructive					Retraction					Medical	Surgical			
Name	Color	Age (Mos.)	Sex	Ass. Disease	Temp. (Max.)	Hoarseness	Cough	Aphonia	Resp. R.	Croupy Cough	Wheeze	Stridor	Sup. S.	Sub. S.	I. Cost.	Dyspnoea	Restless	Cyanosis	Culture		D. Lary.	Intubation	Trach.	
A.C.	W.	18	M.	R.P.	101.8	+		—	24	—	—	+	+			+	—	—	—	Fluids; C. Tent	—	—	—	Full recovery
R.N.	W.	12	M.	R.P.	103.4	+			46			+	+			+	1+	+	—	Seda. C.&O. Tent	—	—	—	Full recovery
K.M.	W.	14	M.	R.P.	104.4	+			Lab.			+	+							Benz. C. Tent	—	—	—	Pallor; listless
A.S.	W.	13	M.	L.T.B.	104	+							+			+			—		2+	—	—	Sl. Hoarse at Disch.
R.B.	W.	12	M.	P.Abs.	104							+	+				2+		+	Steam Room	—	—	+	Sl. Hoarse at Disch.
C.H.	W.	10	F.	R.P.	100	—	+	—	28	+	—	+	+	—	—	+	—	—	—		—	—	—	Full Recovery
R.R.	W.	15	M.	R.P.	100.2	+	+	—	?		+		—	—	—	+	—	—	—		—	—	—	Full Recovery
S.R.	W.	9	F.	R.P.	100	+	+	—	?	—	—	—	—	—	—	+	—	—	—					Full Recovery
W.T.	W.	9½	M.	—	104.4	+	+	—	68	+	+	+	+	—	—	+	+	+	—	20,000 U.A'toxin; 0.Tent	—	24	—	Hoarseness persists
C.C.	W.	12	M.	R.P.	104.2	+	+	—	40	+	—	+	+	—	—	+	—	—	—	Luminal; Mosher L.S.				Hoarseness persists
J.C.	W.	12	M.	R.P.	104.4	+	+	—	?	+	—	—	+	—	—	+	—	—	—	Luminal; Steam	—	—	—	Hoarseness persists
P.K.	W.	5½	F.	AS.B.	99.4	+	+	+	?	—	+	+	+			+	—	+	—		—	—	—	Full Recovery
				L.T.B.																Steam, etc.	—	—	—	Full Recovery
A.T.	W.	14	M.	R.P.	103.4	+	+	—	48		—	—	—	—	—	+	—	—	—	Steam	—	—	—	Dischg. with cough.
H.M.	W.	9	M.	R.P.	103	+	+	—	26		—	+	—	—	—	+	—	—	—	Steam Room; Atropine	—	—	—	Dischg. with cough.
						12	9	1		4	3	9	10			12	3	3	1		2	1	1	

This produces an increase of the intrathoracic negative pressure with the resultant typical indrawing. Restlessness, an ominous sign, appeared in three cases, and with it a fear of sleep, for sleep cuts out the voluntary effort responsible for the activity of the accessory muscles of respiration. Cyanosis appeared in one infant. It is a cardinal warning sign and coupled with the listless appearance of the child, who is too tired to fight, is a condemning picture. Restlessness, fear of sleep, and suprasternal retraction beg for immediate surgical interference, whereas listlessness and cyanosis are signs of such physical depletion that even with the aid of surgical intervention the end is usually but prolonged.

TREATMENT

General and local.

(a) General aims at the setting up and maintaining a proper water balance. It is best taken by mouth, but if an adequate amount cannot be given this way, recourse is had to parenteral or intravenous routes. Liquid and soft foods supply the balance of caloric requirements. In all these cases a nurse thoroughly versed in the care of these patients is in constant attendance.

Medication is mentioned more for contraindication, than indication. Sedatives, as opiates and barbiturates, are contraindicated for they slow respirations and inhibit the cough reflex. All sedatives, as Hyde and Ruchman[9] pointed out, inhibit the voluntary effort needed to keep the accessory muscles of respiration active to relieve the dyspnea. Belladonna or any of its derivatives is contraindicated too, for it cuts down secretions helpful in eliminating the material obstructing the larynx.

Rest is important in these cases. Too frequent examinations and unnecessary minute nursing care disturb the infant and are only conducive to greater fatigue.

(b) Local measures: Croup tents are desirable, but steam rooms are preferable. Vapor saturation of the warm air is conducive to elimination of the thickened material obstructing the narrowed laryngeal orifice. It should not be oppressive for then it only adds to the child's discomfort. Volatile oils, as irritants to the respiratory tract, increase the vascular load and are of little or no therapeutic value. The oxygen tent is a valuable asset and was frequently used in these cases exhibiting dyspnea.

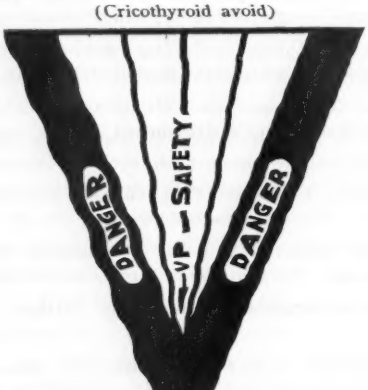
Direct laryngoscopy is indicated, Tucker[8] states, in two groups of symptoms; first, where there is trouble in phonation, including aphonia and croupy cough; secondly, where symptoms of difficult breathing, including stridor, dyspnea and wheezing with suprasternal retraction, are present. The procedure will, for the time being, increase the infant's discomfort, but a correct diagnosis can be made and, with the necessary equipment, any emergency can be adequately handled. Uncontaminated cultures can be had, secretions removed and any pathological condition noted. The subglottic area can be viewed and recommendations made for further local care.

Intubation and tracheotomy are two life-saving measures, one of which should be done where the signs of obstructive laryngeal dyspnea, namely supra and substernal retraction with or without restlessness, are present. Tracheotomy is best done early to preclude emergencies with their resultant calamities, and to prevent insult to the respiratory centers because of prolonged oxygen depletion!

When the cardinal signs of obstructive dyspnea appear, one is forced to choose between intubation and tracheotomy. Intubation may be direct or indirect. Direct is preferred by endoscopists. Indirect may be necessary where an endoscopist is not available. If it is the procedure chosen, it should be done preferably in a hospital where there is at all times an expert or his assistant available upon short notice. No one should attempt this procedure who has not had much cadaver practice! The O'Dwyer tubes are still the most perfected. If intubation is required longer than two weeks, tracheotomy should be done. Tracheotomy amongst the older practitioners has probably justifiably had much opposition, for it is, as Jackson[10] states, one of the oldest surgical procedures, yet is more often badly done than any operation in the whole field of clinical surgery. Yet, if we analyze the situation, we see that it is too often done late, and then as a dire emergency, and is done high, with a secondary laryngeal stenosis as the result. Tracheotomy has the advantage that every practitioner can or should be able to do it correctly, that is, below the second tracheal cartilage. It should be done early.

One should memorize Jackson's tracheotomic triangle and his method of surgical approach

before doing an emergency tracheotomy outside of hospital practice. Keep in the midline; bring



Sternal Notch
Jackson's Tracheotomic Triangle
Photograph 2.

the trachea into relief; push aside the sternocleidomastoid muscle and vascular compartment; incise from the cricoid to the suprasternal notch. Protect the scalpel with the right third finger and cut below the second tracheal cartilege. In hospital practice we insert an infant bronchoscope past the obstruction and then do a tracheotomy over the rigid tube, inserting the cannula as we withdraw the scope. The late Fletcher Ingalls,[11] a pioneer Chicago endoscopist, years ago called attention to the advantages of this procedure. Immediate postoperative tracheotomic care should be in the hands of a nurse thoroughly versed in the care of tracheotomized patients, one who will constantly keep the airways clear with adequate aspiration and notify the doctor when any symptoms of respiratory obstruction do not respond to this procedure.[1]

In this series of fourteen cases, only one patient required repeated intubation; he is still somewhat hoarse. One case required tracheotomy which was done through the third tracheal ring and the subsequent course was uneventful. All fourteen cases recovered. Hoarseness still persists in three cases.

CONCLUSION

Specific acute laryngitis in infants is a pertinent pediatric problem. When signs of obstructive dyspnea appear, the endoscopist or the endoscopically-trained laryngologist should be summoned. For immediate relief either intubation, the use of life savers, or tracheotomy is necessary. We believe that in infants low tracheotomy conserves the laryngeal structure better than intubation.

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DISCUSSION

Dr. Paul Holinger, Chicago: This is an extremely interesting paper and hardly needs further discussion because Dr. Greenwood has covered the subject so completely. We all realize the urgency with which these patients have to be seen and treated in order to save life. Obstruction of the larynx in a child is an emergency one must be ready to meet. When we realize how small the larynx of an infant really is, it is easy to see that with even a slight inflammatory reaction there is great danger to life.

The use of atropine and morphine in cases of acute laryngitis is to be condemned, because it reduces the infant's ability to breathe through an already obstructed larynx, and because the desiccated secretions add obstruction to the airway. The lymphatics carry infection downward in much the same way that erysipelas travels on the skin, and only too frequently they carry infection down to the trachea or bronchii, bringing in another type of infection—laryngotracheobronchitis. The differential diagnosis can be made by endoscopy, but this raises another controversial point. Because of the risk of doing a direct examination in a patient with obstruction we hold off as long as possible. If the procedure can be avoided, it should not be done, because only too frequently it precipitates an acute emergency in a child. In many large clinics a direct laryngoscopy is performed on admission in every case of laryngeal obstruction in children, in order to make an accurate differential diagnosis. The diagnosis can be made fairly accurately, however, from the clinical picture and his-

tory, and only in doubtful cases should laryngoscopy be done. There are two schools of thought; one advocates direct laryngoscopy immediately; the other prefers to postpone it as long as possible. Of course, such an examination can be made only by means of the direct laryngoscope, and this should always be available when treating cases in which there is obstruction.

One of the most satisfactory procedures in cases of acute obstruction when tracheotomy is imminent is to make a tranquil operation out of an emergency procedure. The bronchoscope is inserted for safety's sake and serves a double purpose, since it affords a view of the trachea and bronchia and, at the same time, relieves the dyspnea.

I certainly enjoyed listening to Dr. Greenwood's paper.

Dr. Thomas C. Galloway, Evanston: The question of diseased or abnormal conditions in obstructive laryngitis is not so simple. Various investigators have demonstrated, following obstruction in a bronchus, marked disturbance in the lower bronchial tree, including vascular changes, edema, exudate, capillary damage, atelectasis, emphysema and perhaps later bronchiectasis. Tracheobronchitis is often a complication of laryngitis and may be severe enough to require cannulation.

We should be prepared to put in a bronchoscope or do a tracheotomy, and we do not make a laryngeal examination until we are ready to do so. When one has once done a tracheotomy over a bronchoscope he will be loth to do it any other way. When the bronchoscope is in place we can take our time about tracheotomy. I much prefer a tracheotomy to intubation in these cases because it permits aspiration of the thick, tenacious secretion. However, one gets more crusting than with intubation.

Very little has been said about postural drainage in treatment of these cases and I think it is important. The foot of the bed must be elevated at least 15 degrees, and it is better with a young patient turned on the face. (A colored film, illustrated treatment of laryngotracheobronchitis, including bronchoscopy, deliberate tracheotomy, postural irrigation and drainage.)

Dr. Glenn Greenwood, Chicago (closing): There is nothing further to add, except that I wish to say that prior to 1935 at Children's Memorial we had real difficulty in getting the pediatricians to cooperate with us, because we did not fill their expectations of what should be done. Since Dr. Holinger has come out we have had a complete bronchoscopic unit installed, and have had the greatest cooperation between all departments.

It has been some months since we've seen in the letter column a communication from "Taxpayer." We fear the old codger can no longer afford postage stamps.—*Washington Post.*

Doctor: "How did you come by the broken leg?"
Mike: "D'you see thim stairs?"
Doctor: "Yes, I do."
Mike: "Well! Oi didn't!"—*Health Digest.*

ESTROGENIC THERAPY OF MENOPAUSAL DISORDERS

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In a previous publication a syndrome suggestive of estrogenic deficiency was presented. Subsequent experience has demonstrated that such is not always the case prior to the menopause but that during or after the menopause any combination of the following symptoms must be given consideration as evidence of estrogenic deficiency.

SYNDROME SUGGESTIVE OF MENOPAUSAL DISORDERS

Hot flashes.
Exhaustion.
Insomnia.
Nervousness and irritability.
Vaginal irritation.
Psychic disturbances (emotional instability, weeping, depression, disturbing dreams, apprehensions of social contacts and suicidal tendencies).
Headache
Nausea.
Backache.
Leg pains.
Dizziness.

ASSOCIATED CONDITIONS

Hypertension.
Atrophic rhinitis.
Colitis.
Arthritic symptoms and
Skin eruptions.

Corroboration of these clinical observations has been provided by the work of Papani colaou[2, 3] et al and Davis.[4] Both groups have demonstrated, one by means of vaginal smears, the other with biopsies of the vaginal mucosa, that adequate estrogenic therapy in menopausal disorders produces a return to normal of the vaginal mucosa accompanied by symptomatic relief, and that cessation of therapy is followed by regressive changes in the vaginal mucosa with recurrence of subjective symptoms. This relationship between vaginal change and clinical response has been encountered so consistently in a series of patients at various stages of therapy as to indicate that where methods for vaginal smear are not available subjective symptoms may

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be accepted as indication for therapy, and clinical response used as criteria for dosage.

Endocrine factors involved. Quantitative determinations of estrin and prolan content of the blood and urine have provided an explanation of the changes in glandular function responsible for the variations and multiplicity of symptoms of the menopause. Cessation of ovarian function is accompanied first by reduction of the blood estrin and later by progressive increase in blood concentration of prolan[4] (the follicle stimulating factor of the anterior pituitary). Adequate replacement therapy with estrogenic substances causes an almost immediate return to normal of blood estrin which when maintained is followed by decrease of prolan in the blood and alleviation or complete disappearance of clinical symptoms.[4] These observations indicate that normal pituitary function is dependent on normal blood estrin content and that low estrin levels permit abnormal function of the anterior pituitary, resulting in disturbance of the entire glandular mechanism. Restoration of normal estrin levels by replacing the normal regulatory mechanism of the anterior pituitary promotes return of normal function of the glandular system with disappearance of the subjective symptoms.

The validity of the above conclusions would seem to be substantiated by clinical results. When menopausal symptoms are corrected by adequate estrogenic therapy *soon after* their initial appearance prompt and complete relief is obtained and the severe symptoms are entirely avoided. Conversely, if therapy is delayed until the later stages, much larger amounts of estrogenic substances over a longer period of time are necessary before the same degree of symptomatic relief is obtained.

Principles of Therapy. One of the most confusing factors in the treatment of menopausal disorders has been that hot flashes, probably one of the most frequent and disturbing symptoms of the menopause, have become synonymous with the term "menopause." As a result, absence of hot flashes has been accepted as indicating absence of menopausal disorders. On the contrary, careful analysis frequently reveals various combinations of symptoms with complete absence of hot flashes which nevertheless may be accepted as an indication for estrogenic therapy. Since the introduction of estrogens of high concentration it has been possible to obtain relief in a much larger proportion of patients. The variations of therapeutic requirements which have been encountered provide the explanation for the failure of routine methods in the treatment of menopausal disorders. Accurate determination of the requirements in each instance is necessary to obtain maximum relief.

Three types of reaction following parenteral administration of estrogenic substances have been observed and found of value in establishing the diagnosis and in determining the dosage in each individual. These reactions occur within one hour after intramuscular injection and are of considerable significance even though transitory.

1. *Total absence of reaction—usually indicates* that estogenic deficiency exists, and that initial dosage has been inadequate and should be increased.

2. *Improvement or relief of symptoms* and a feeling of well-being is evidence than an actual estrongenic deficiency exists and that therapy should be continued.

3. *Exaggeration of symptoms,* extreme exhaustion, pain in ovarian regions, or bearing down sensations.

a. If transitory and followed by relief of original symptoms, indicate that estogenic deficiency exists but that dosage was excessive and should be decreased.

b. If prolonged and not followed by relief of original symptoms that estogenic deficiency does not exist and therapy should be discontinued.

Determination of dosage. A combination of parenteral and oral therapy is used in the treatment of menopausal disorders. Determination of the dosage required in each instance is first obtained by intramuscular injection of amniotin in oil. Depending on the severity and duration of the symptoms, from 100 to 500 international units of Squibbs amniotin are injected into the deltoid muscle. The patient is instructed to observe the effect within an hour and is asked to report daily. The clinical response as outlined above is used as the criterion for increase or decrease of succeeding injections. The unit strength of the daily injection is increased until the minimal amount is ascertained which will give symptomatic relief for from three to 12 hours. This dosage rarely exceeds 10,000 units and upon its determination the patient is placed

on oral therapy in divided doses. If the parenteral requirements have ranged from 1,000 to 10,000 units, oral therapy of from 3,000 to 20,000 units of amniotin is given daily in capsule form (1,000 or 2,000 unit capsules). If the requirements have ranged from 300 to 1,000 international units, an oral preparation of lower potency is indicated and the patient is placed on from 150 to 600 biological units of progynon (50 unit tablets). Daily requirements of 300 units or less indicate the presence of a very mild deficiency and Collip's emmenin is used in either tablet or liquid form, giving either one tablet or its equivalent, 1 dram of the liquid preparation, three or four times daily. In those patients who obtain relief or manifest adverse symptoms with subsequent improvement, with as little as 100 units of amniotin parenterally, complete symptomatic relief may be possible with as little as ½ dram of emmenin two or three times daily.

If complete relief of symptoms cannot be maintained by oral administration alone, adequate amounts of amniotin in oil are given parenterally as an adjunct. When such additional therapy is necessary progressive decrease in frequency and dosage is possible until eventually symptomatic relief may be maintained by oral medication only. The patient is instructed that continuity of therapy is the most important factor in obtaining permanent results and that as results are maintained, reduction of oral dosage becomes possible and necessary. This reduction is continued until each patient is eventually placed on the liquid preparation of Collip's emmenin which in addition to being the mildest form of the estogenic preparations is best adapted for obtaining the small, divided doses required at this stage of the treatment. In almost every instance it will eventually become possible to reduce the dosage to one half dram of emmenin once or twice weekly. In a large series of cases it has been found that even at this point, cessation of therapy is followed by recurrence of symptoms in from three months to one year. During the past two years in those patients who have continued on small dosage without interruption it has been possible to maintain a permanency of therapeutic results which in addition to being the eventual goal has done much to justify the initial expense.

Clinically it has been ascertained that the symptoms produced by excessive therapy are as distressing to the patient as those resulting from lack of therapy. Any adverse symptoms which develop after a maintenance dose has been established are usually due to the fact that the requirements of the patient have decreased and that reduction of dosage is necessary. If improvement does not occur promptly therapy should be discontinued temporarily and resumed only after disappearance of adverse symptoms.

ILLUSTRATIVE CASE REPORT

M. D. 3-4-38. Age 48, unmarried. Menses began at age of 15, irregular at first, then every 28 days, duration four to five days, profuse, no pain. Absence of menses for past two years.

Symptoms. Hot flashes, exhaustion, backache, feeling of pressure in head, dizziness.

Physical findings. B.P. 154/84. Uterus small and third degree retroversion present. Adnexia normal. Moderate macroscopic atrophic changes in vaginal mucosa.

Therapy.	*Parenteral Amniotin in oil.*	
3- 4-38	200 I. U.	No change.
3- 5-38	500 I. U.	No change.
3- 7-38	1000 I. U.	Feeling of well-being of short duration.
3- 8-38	2000 I. U.	No marked changes. Still having flashes and perspiration.
3- 9-38	5000 I. U.	Felt light-headed following injection but no flashes, decreased dizziness and perspiration.
3-10-38	4000 I. U.	Oral therapy started. Progynon tablets 50 units, t.i.d.
3-12-38	4000 I. U.	Feeling better, no hot flashes, no dizziness, occasional fullness in head.
3-14-38		Feeling better. Previous symptoms have disappeared. B.P. 140/80 and progynon increased to 1 tablet q.i.d.
	500 I. U.	
3-28-38		Definitely better, but occasional lightheadedness and pruritis. B.P. 130/80. No injection.
3-30-38		Occasional dizziness. Pruritis has disappeared. B.P. 130/76.
	500 I. U.	
4- 9-38		Fullness in head. Exhaustion.

	500 I. U.
4-12-38	Improvement after last injection.
5- 4-38	Has been entirely free from previous symptoms except occasional dizziness and recent pruritis. B.P. 128/74. Oral therapy decreased to progynon 50 units t.i.d.

Prophylactic Therapy of Surgical Menopause. Surgical menopause following bilateral oophorectomy, or ovarian ablation by means of x-ray or radium, is known to produce the most severe type of menopausal symptoms. Institution of estrogenic therapy at the time of operation with gradual increase in therapy as indicated will greatly minimize, and in some instances, entirely prevent subsequent development of untoward symptoms. In the more mild type resulting from hysterectomy with or without partial removal of ovarian tissue, therapy prior to operation is often indicated by the presence of characteristic symptoms. In either group adequate therapy immediately following operation will have a marked beneficial effect on the postoperative convalescence.

Relationship of Estrogenic Therapy to Carcinoma. The relationship of the estrogens to carcinoma is of universal interest. That there is an association has long been apparent but at the present time there is no evidence that estrogenic therapy has been an etiologic factor in the production of carcinoma in women. On the contrary, the development of this condition in women occurs most frequently at the time of, or after the menopause. The fact that this development coincides with the period of greatest estrogenic depletion in women cannot be reconciled with the contention that correction of this depletion by estrogenic therapy may be an etiologic factor. Consideration from this viewpoint suggests strongly the possibility that the deficiency itself may be a most likely factor. Experimentally, carcinoma of the breast has been produced in mice by massive dosages. The fact that the experimental animal is a normal functioning glandular mechanism and that correspondingly massive doses for women are not available may be of significance. It is, however, true that the development of the tissues in the breast and genital organs from which carcinoma develops is dependent on the control of the active principles of the ovary, namely estrin and progesterone. The fact that carcinoma is an abnormal growth of these normal tissue cells would suggest some abnormal endocrine activity as a possible etiologic factor.

It is the belief of the author that if subjective symptoms are used as a criteria for therapy, estrin will be administered only in those women having an estrogenic deficiency, while massive doses administered to women having normal ovarian function might result in abnormal tissue growth and the production of carcinoma. An analagous situation may be cited in our knowledge of the relationship of x-ray and radium to carcinoma. It has long been a matter of common knowledge that both of these factors, while being effective in the destruction of cancer cells, also in some instances serve as etiologic factors in their production. May not the same thing be true of the estrogens? Improvement in assay methods offers the greatest possibility for enlightenment on this question. In the meantime, in view of the lack of more definite evidence and the highly beneficial results of estrogenic therapy its continued judicious application seems to be indicated.

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I desire to express my appreciation to Mr. McKenna of Ayerst, McKenna & Harrison, and to Dr. Morrell of E. R. Squibb & Sons, for the large quantities of estrogenic substance they have provided for this study.

DISCUSSION

Dr. Fred S. Stahmann, Peoria: Dr. Schneider has given us a very complete and practical presentation of the use of estrogen in the management of the menopausal patient.

The types of immediate reaction observed after the administration of estrogen are especially interesting, and by closely observing them, together with a close analysis of the patient's symptoms, we should be able to determine the type of patient that will respond to estrogenic therapy with greater certainty.

I would like to emphasize the point that frequently quite large amounts of estrogen are necessary at the outset to obtain satisfactory results in most cases, as well as the importance of continuing the therapy when symptoms are once under control to prevent severe exacerbations. Recent reductions in their cost, and the production of estrones of high concentration, make it much easier to begin adequate therapy and by util-

izing a plan of combined oral and parenteral therapy, we can more satisfactorily follow these patients throughout the duration of their discomfort.

Dr. Fred H. Falls, Chicago: I think Dr. Schneider's conclusions are correct, that a balance of the hormones will be found to be necessary rather than the presence of any one hormone. The varying amounts of progestin in the blood in various menopausal problems is interesting. In my experience in the use of estrogenic substance for menopausal disorders, emmenin has given the best results. It is well to remember the point Dr. Schneider brought out that we can do harm by the use of these hormones as well as good. The suggestion for trying them out is good; if the symptoms become worse, then the injections should be discontinued. The whole subject awaits a very important piece of work from the laboratory man, namely, an accurate clinical method for the establishment of the amount of these hormones in the blood. As soon as we have a method by which we can say there is so much estrogenic hormone in the blood, so much thyroxin, so much progestin, so much anterior pituitary hormone, then we will be able to make an analysis and to attempt to restore the balance that is upset by the menopause and the treatment wil be on safe ground. At the present time it is more or less a matter of trial and error.

Dr. Philip F. Schneider, Evanston (closing): I would like to thank Dr. Stahmann and Dr. Falls for their discussion. I am sorry that it has not been possible for me to have some of the slides available for demonstration of the vaginal smear method. In the patient with menopausal symptoms the vaginal smear is of considerable diagnostic and prognostic value.

RADIOLOGIC AIDS IN THE DIAGNOSIS OF HEART DISEASE IN CHILDREN --A REVIEW

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The modern roentgenologic examination of the heart in children is of unquestionable aid in the diagnosis of cardiac disorders. In general, the same radiologic methods are used as in the adult. The fluoroscopic examination and the teleoroentgenogram or two-meter plate of the heart are the principal methods used in children. The fluoroscopic study approaches a more physiological examination while the teleoroentgenogram is a permanent objective record and demonstrates fairly accurately cardiac shape and size. In infants a teleoroentgenogram at 60 cm. distance may be used without error. The teleoradioscopic projection of the heart shadow is a fluoroscopic examination with the tube at a distance of 200 cm. It is not used generally because a tube of greater energy output is necessary. The orthodiagram is a direct tracing, made by the observer, with a movable tube connected to a writing arm, in which only the central parallel rays are used. It is an accurate, simple, and inexpensive method and well adapted to older children. Infants are best examined under the fluoroscope.[1] The roentgenokymographic tracing of the heart silhouette has been shown to be of value in adult cardiac examination, whereas in pediatrics, it has been rarely used and must await further study before an evaluation of the method can be made.

In infancy and early childhood the value of the radiologic examination is considerably overshadowed by that of the child after five years of age. This is due to anatomical changes as well as etiological factors. The cardiac silhouette of infancy is less differentiated because the auricles are proportionately larger, the ventricles approach each other in size and the thymus causes the heart to assume a more transverse position. The infant's heart is considerably larger in comparison to the body weight than that of an older child, and its superior inferior diameter decreased. Etiologically, the heart shadow shows few characteristic changes of radiologic value besides congenital lesions. This is obviously due to the rarity of rheumatic fever in infancy and early childhood.

A fundamental understanding of the normal anatomy of the heart is imperative for proper interpretation of cardiopathological change. The anatomical borders of the heart are best studied in the postanterior, right and left anterior oblique positions. The right cardiac border in the post-anterior view is composed of three parts. The upper portion is formed by the superior vena cava and is prominent and relatively larger in young children. The middle right heart border is formed by the ascending aorta and is not seen until after the age of six to eight years. It is usually small and indistinct and during infancy may not be seen. The third and lower portion is a large distinct bulge of the right auricle, proportionately greater and well to the right of the sternum in young children. In infancy and early childhood the right heart

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silhouette is distinctly convex, longer and bulges more than in the older child's heart. The left border of the cardiac shadow is somewhat longer than the right border in young children, but almost equal in length during infancy, and definitely longer in older children. The aortic knob or uppermost part of the left heart shadow is not normally present in infancy and childhood until after the age of six to eight years. The pulmonary conus is the next lower border and is composed of the upper right ventricular infundibulum and pulmonary artery. This shadow like the aortic knob is not seen in early childhood. The left auricular appendage shadow lies immediately below the pulmonary conus and forms a long border in early infancy and a very small straight or slightly convex border in childhood. The left ventricular shadow composes the lower two-thirds of the left heart border, from the left auricular border to the diaphragmatic leaflet. Often in infancy and early childhood the entire caudal border of the heart is visible. The oblique projection of the heart shadow is of little value in infancy and early childhood, but after the age of three or four these views are increasingly important. The right anterior oblique position is invaluable in studying the size of the auricles, especially the left in relationship to the barium filled esophagus. The left anterior oblique position is imperative in all heart examinations because of the clear visibility of the course and position of the aorta and size of the ventricles.

The diagnosis of general cardiac enlargement by the roentgen ray has become an important procedure in pediatrics. A murmur of dubious origin may be interpreted more intelligently; serial plates or tracings may indicate early enlargement, improvement, or regression of an active rheumatic cardiac involvement.

During infancy and early childhood the transverse diameter of the heart is generally conceded to be inaccurately correlated to body build, weight, height or width of the thorax. A more significant relationship is found in children after the age of four to five years, and the size of the heart shadow can be interpreted with more assurance. The most popular method used today to indicate cardiac size is the study of the cardiothoracic index. To determine the size relationship of the heart to the chest by this method the cardiac shadow must be measured in its widest diameter in the postanterior view. This is commonly drawn and measured on the screen or flat plate. A vertical line is made in the midline of the chest corresponding to the dorsal spines. The lateral shadows of the heart at their widest diameter are now drawn. The left horizontal diameter is made from the midline to the widest area of the left heart border. The right horizontal diameter is drawn from the midline to the right heart border in its widest diameter. The combined measured distance from the left border to the midline and from the right border to the midline in its maximal width is called the transverse diameter of the heart. The internal diameter of the chest is a transverse line drawn between the widest points of the chest immediately above the lateral diaphragmatic attachment. The relationship of the transverse diameter of the heart to the internal diameter of the chest is called the cardiothoracic index. The normal transverse heart diameter is generally agreed not to exceed 50-60% of the internal diameter of the chest. Some pediatricians feel, however, that 50% or more constitutes an abnormally enlarged heart. There is evidence also to indicate that 25 of 100 normal children may have a cardiothoracic index over 50%.[2] A heart is rarely normal if it exceeds 57-60% of the internal diameter of the chest and therefore is the norm of choice in determining enlargement by the cardiothoracic index. These measurements show an error when the pulmonary conus is enlarged, and therefore, other diameters are necessary. Cardiac enlargement may be detected by known standard normal measurements with tables for various types of body build according to age, length and weight, or accurately from calculations with formulas and expressed as frontal area in square centimeters. Volume determinations are not generally used but are the most exact expression of cardiac size.[3] The heart size determined by measurements of the cardiac shadow should be generally interpreted freely and are perhaps better than no measurements. It is difficult especially in the young child to rely upon so-called normal standards and sometimes general impressions are more reliable than cardiac measurements.

Individual and multiple valvular lesions of the heart produce characteristic cardiac chamber enlargement which may often be suspected or diagnosed from the cardiac silhouette. It is well

known, however that severe rheumatic carditis especially in its initial phase or advanced decompensated and dilated hearts may obscure all characteristic chamber enlargements in children regardless of high grade valvular lesions. In these conditions cardiac enlargement may be obvious but the valvular chamber enlargements are obscured. The true value of the radiologic examination is in cases of valvular lesions of the mildly active rheumatic involvement or inactive rheumatic heart disease with or without mild or moderate congestive failure. Pure aortic valvular lesions from rheumatic fever, especially with free aortic regurgitation or high-grade aortic stenosis produces a left ventricular enlargement. In the presence of aortic stenosis, the postanterior view of the lower cardiac border is rounded and enlarged usually slightly to the left; nothing of note is seen in the aortic area. Free regurgitation of the aorta and hypertension produces a more marked enlargement of the left lower cardiac border downward and to the left producing the "boot shape" heart. The aortic knob in the former may be prominent and wide fluctuations noted along the aortic course and left ventricular border. The oblique views, especially the left anterior oblique, confirms these findings.

Mitral regurgitation is the common valvular lesion of childhood. The cardiac silhouette shows mild enlargement of the left ventricle and the right ventricular enlargement causes some fullness of the pulmonary conus. The left cardiac border is therefore straighter than the concave border of the normal heart. The left auricle is only slightly enlarged and usually does not produce a deviation of the barium filled esophagus in the right anterior oblique position.

Mitral stenosis, however, produces a more typical configuration. The left ventricle is not enlarged and the right ventricular enlargement pushes the non-resistant left ventricle to the left. The aortic knob is seen poorly, or not at all, but the pulmonary conus becomes prominent in the postanterior view causing the middle portion of the left cardiac border to become straight or convex producing mitralization or the so-called egg-shaped heart of mitral stenosis. The marked dilatation of the left auricle from high grade stenosis is usually not seen in postanterior view; but in the right anterior oblique position can be well seen encroaching upon the retrocardial space and deviating the barium filled esophagus in a definite posterior curve. The esophagus may be displaced slightly to the right in the postanterior view. The roentgenologic evidence of mitral stenosis may be the only immediate means to differentiate causative factors producing a diastolic murmur at the apex.

Late congenital syphilis with simple or complicated aortitis is a pathological curiosity in children.[4] A widening of the aorta with free pulsations must not be taken lightly as a syphilitic aortitis. Rheumatic aortic regurgitation, hypertension, and coarctation of the aorta must be excluded before luetic aortitis can be considered in the diagnosis.

The heart shadow is influenced by vitamin deficiency diseases and the roentgenogram is of considerable aid in the diagnosis of nutritional cardiac conditions of infancy and childhood. Beriberi may produce a bulge of the pulmonary conus and right lower cardiac border. Infantile scurvy, according to Hess[5] produced cardiac enlargement more especially of the right ventricle and broadening of the base of the cardiac shadow by the roentgen rays. Vitamin D deficiency apparently causes cardiac enlargement of one or both ventricular chambers probably from thoracic deformity.

The heart in the hypothyroid state during childhood may be generally enlarged, and the radioscopic examination may simulate a pericardial effusion. Very little is known, however, of the heart in hypothyrodism and cretinism during childhood and other conditions producing cardiac enlargement to the right and left must be eliminated before such a diagnosis is attempted.[6]

Deformities of the chest and spine produce cardiac displacements and sometimes cardiac embarrassment. Deep funnel chest from acquired or congenital causes usually displaces the heart into the left chest and may also produce right or left, or combined, ventricular enlargement. Kyphoscoliosis also displaces the heart; right convexity causes left displacement, the heart having a mitralization silhouette; left convexity, a right displacement and wide aortic configuration.

Pericardial disease has assumed an important position in pediatrics and the roentgenological examination may often be the only means of detecting the lesion. Moderate or large free

effusions of the pericardium are demonstrated by absent or decreased cardiac pulsation, characteristic rounding of the silhouette, i. e., "water bottle shape" and shortening of the vascular shadow. Advanced cardiac dilatation often presents a similar contour to pericardial effusion, and may be indistinguishable. Small effusions are difficult or impossible to detect in young children but in older children may be suspected by observing a collection of fluid at the level of the inferior vena cava in the inferior posterior recess or sinus of the pericardial cavity. Chronic pericarditis occurs pathologically in two types: first, pericardial thickening with adhesions to the mediastinum and surrounding structures producing a mediastinopericarditis. The cardiac silhouette is usually enlarged and fixed; tent-like shadows occur along the margins and there may be mitralization of the left cardiac border. It should be noted, however, that the heart is subject to various changes in shape and size due to the underlying disease associated with the pericardial involvement. The second and more important chronic pericardial disease is the so-called Pick's disease or chronic constrictive pericarditis. The heart pathologically is encased in a fibrous or callous-thickened pericardial sac producing a marked constriction of the heart and causing an "inflow stasis" simulating a right ventricular congestive failure. The thick pericardium covers the right auricle and great veins, while the cardiac apex may be relatively free. The surgical resection of the thickened pericardium has amazingly relieved some patients having this condition.[7] The x-ray and electrocardiogram are of aid in diagnosing this condition. The heart shadow is ordinarily not enlarged or only slightly so. Cardiac pulsation may be free at the apex with no pulsation at the right border. Commonly and especially with cardiac congestion, the supracardiac shadow is wide. Pericardial calcification is an important sign, but often is absent and may occur in other chronic pericardial diseases.

Congenital cardiovascular malformations are difficult to diagnose clinically as well as by roentgenologic observations. The information gained from the radioscopic examination is rarely diagnostic, nevertheless, with the modern trend to determine specific defects it is of real value in all congenital cardiovascular malformations. After the history and physical examination the x-ray is of great importance and is of superior value to the electrocardiogram. In a consideration of an acquired or congenital lesion in any suspected child the disposition of the case cannot be complete without the use of the x-ray. Congenital defects may be present however, without any change or may give only vague information as to the causative factors of cardiac enlargement. The decreasing incidence of multiple complex congenital lesions and the increasing differentiation of the cardiac silhouette after infancy greatly enhance the value of the radioscopic examination.

Dextrocardia is the most important congenital malposition to recognize. The true or so-called "mirror type" shows complete transposition of the chambers, i. e., the left cardiac chambers on the right side, and is almost always associated with visceral transposition. The usual absence of other intrinsic congenital cardiac defects precludes a good prognosis. The isolated or false type anatomically has no true transposition; the heart is merely lying in the right chest with the left chambers to the left. It may sometimes be recognized by the left course of the aorta. Usually there are present associated cardiac congenital defects to alter the form of the heart and make the prognosis less favorable.

Abnormalities of the cardiac chambers with septal defects are the most common congenital lesions. Patency of the foramen ovale is of little import and the common small "anatomically open, functionally closed" defect discloses no roentgenological signs. If the interauricular septal defect is large and associated with other congenital lesions, or acquired valvular disease such as mitral stenosis, the heart is of enormous size. The pulmonary conus may be enlarged with a sharp definition of its branches in the lung fields. The heart may be globular with enlargement of the right auricular shadow and the aortic knob may be hypoplastic. Interventricular septal defect also commonly show no characteristic cardiac shadow. This lesion usually accompanies other congenital defects and if the heart silhouette is not entirely normal there may be a slight globular shape of the heart with enlargement of one or both ventricles or mild fullness of the pulmonary conus.

Patency of the ductus arteriosus produces no unequivocal diagnostic shadows, and in young children with a left basal systolic murmur, the

roentgen-ray may disclose only a slight or no pulmonary conus bulge. Later in childhood and when the murmur becomes more marked in intensity, or continuous in time, a characteristic shadow may be produced. The pulmonary arch pulsates, the conus bulges and the heart chambers are slightly enlarged. Occasionally in older children with wide patency one sees an area of density or pulsation under the aortic arch in the left anterior oblique view.

Pulmonary stenosis rarely occurs alone, and may show no characteristic shadow. Occasionally the pulmonary conus is dilated but may be normal or hypoplastic. Complicated pulmonary stenosis is usually associated with interventricular septal defect and right ventricular hypertrophy. The combined lesions with dextro-position of the aorta represents the most common multiple congenital defect and is known as the tetralogy of Fallot. This condition may be suspected roentgenologically by a cardiac contour simulating a wooden shoe or so-called coeur en sabot. The characteristic finding is a blunt and almost straight apical border forming an acute angle with the left diaphragmatic leaflet. This border is caused by the enlarged right ventricle displacing the left ventricle posteriorly and superiorly. The base of the heart is not full and shows usually a concave depression.

Coarctation of the aorta may produce mild left ventricular enlargement and pulsations of some degree of the ascending aorta. The erosion of the posterior and lower margins of the ribs is rarely seen in children, but in the older age group one may find this diagnostic sign. It is generally difficult to outline the aorta in the left anterior oblique position in young children and therefore the narrowing of the aortic arch may only be demonstrated in older children.

Congenital idiopathic hypertrophy of the heart is a very infrequent condition occurring during infancy, and is considered by some as a dubious entity. The radiological examination sometimes discloses an unsuspected cardiac enlargement. The silhouette is one of general cardiac enlargement with preponderant hypertrophy of the left ventricle and may be of such huge proportions as to almost completely fill the left lower chest.[8]

In conclusion, the visualization of the cardiac silhouette by the roentgen-ray, although not new, is now just beginning to be generally recognized as an important aid in the diagnosis of heart disease in children. The radiologic examination usualy gives but confirmatory evidence of heart disease, but may add useful and interesting information in the diagnosis, prognosis and management of the child with heart disease.

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W. L. Crawford (Rockford): I shall have time to comment only on two or three things. I want first to stress what Dr. Lawler brought out about cardio-thoracic shadows as a guide to heart disease. In talking to the general man, not the cardiologist or roentgenologist, I think it is a very good working rule, when you have the film in front of you and line it up and mark off the heart shadow, if you will space your ruler or whatever you are measuing with, with the spinal column and roughly divide the chest in half, that will give a fair idea of the upper limit of cardiac size. Dr. Lawler mentioned the fifty-two to fifty-five per cent. If the heart is larger than half the distance, be alert to look for some cardiac abnormality or disease. Where it is an A.P. or P.A. film, it is also important whether the child is absolutely straight on the film at the time it is taken. But I think it is a simple and homely guide that will stand one in good stead many times.

In the last of his paper, Dr. Lawler commented about avitaminosis, scurvy, glycogen storage and idiopathic hypertrophy. I think many of those things would have been grouped under idiohypertrophy of the heart ten years ago. Dr. White, of Boston, first brought it out. Others repeated it. You should be careful about making a diagnosis of common idiohypertrophy of the heart. Usually we have not been able to put it in the proper pigeonhole. Most of these have a better diagonsis than that if we can make it.

I would like to comment on the fact that the early infantile x-ray of the heart shadows is very apt to show this globoid appearance. It does not have the appearance of the elongated cardiac shadow shooting off to the left in children five or six months old, or even to a later age—sometimes several years.

I think sometimes we get into pitfalls if we do not

remember how the globoid appearance of the right auricle can be increased.

Dr. Crawford: Dr. Lawler said I would speak about dextrocardia. In the last few weeks I saw a baby about three weeks old. In talking to the father afterward he said, "What about that heart?" I asked what he meant and he said, "You know the heart is on the right side." I had already finished my examination and was rather on the spot. I went back and examined it and it was perfectly obvious the heart was not on the right side. The apex beat was over. I talked on the telephone to the x-ray man in the nearby town who had taken this film and asked him to send it. They had taken the film of the shoulder. They had an oblique picture and had shown this right auricle in the right side of the chest and it seemed somewhat like an apex. After you looked at it carefully you could see it was not. Because of that they made a diagnosis of dextrocardia and told the people about it, but further examination did not substantiate it.

MYXEDEMATOUS HYPOTHYROIDISM ASSOCIATED WITH PSYCHOSIS

A. Simon, M. D.

ELGIN, ILLINOIS

The mental state accompanying myxedema is one of retardation. The alternations of the skin, tongue, and lips, consisting of myxedematous swellings, produce an expressionless, swollen face and diminished ability of mimicry so that the patient appears stupid. The patient looks demented but there is no dementia. The swelling involves the tongue and mucous membranes, resulting in a thick speech, as though the speech mechanism were frozen. The gait is slow and clumsy. One must differentiate between psychoses with cardiorenal disease, involutional melancholia, dementia praecox, cerebral arteriosclerosis, organic brain disease, etc.

The psychic effects of hypothyroid deficiency, such as retardation, apathy, drowsiness, forgetfulness, irritability, etc., are seen as symptomatology. These phenomena are considered by Crile[1] to be due to decreased permeability of all the cells of the organism, leading to a decrease in nutrition and oxidation. Thommen[2] states that the symptoms are due to faulty nutrition of cells and infiltration of various tissues with products of faulty catabolism.

Akelaites[3] states that in every case of myxedema not complicated by a psychosis there is a specific mental state characterized essentially by psychomotor retardation and fatigability. Since the patients appreciate their difficulty, they are apt to be depressed and irritable—this is dependent upon the degree of myxedema. He describes several stuporous cases characterized by clouding of consciousness with mild hallucinations, also cases with unsystematized delusions of persecution and excitability. Under appropriate thryoid therapy definite improvement occurred.

Karnosh and Stout[4] describe four cases, and state that the age of the patient seems to modify greatly the reaction pattern, as do involutional and arteriosclerotic changes. Spontaneous myxedema, though it may occur at any age, is common in the involutional period of life, and this critical period seems to upset the equilibrium of the individual. Young individuals with myxedema, especially those with excessive schizoid personality, are prone to develop a vivid dissociation and hebephrenic regression.

Ziegler[5] has observed that thyroid deficiency appears to have the effect of bringing into relief latent hereditary dispositional and constitutional tendencies. These predisposing factors are as varied in myxedematous individuals as in the general psychopathic population.

Although the diagnosis of psychosis with myxedema is rare, three cases have been observed at the Elgin State Hospital during the past few years. These cases are reported to emphasize some of the factors which may modify or determine the reaction pattern and course of the psychosis.

Case 1. A 38-year-old white woman, admitted 10/16/36. Family history negative for nervous and mental disease. Birth and early development normal. She had a common school education and worked as a maid until her marriage six years prior to admission. She entered a convent in 1923; remained three months, and was dismissed because of her strange behavior. She had four children, and was described as a rather reserved, quick-tempered, and domineering individual.

In 1926 patient developed symptoms of hyperthyroidism and a thryroidectomy was performed. Six months later the first mental symtoms were noted. She talked in a rambling manner continuously, paced the floors, wandered away from home, developed ideas against her father and demanded money to be given to

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Read before Physicians' Association of Department of Public Welfare, State of Illinois at meeting of Illinois State Medical Society, May 17, 1938, Springfield.

From the Elgin State Hospital.

I wish to thank Dr. James H. Hutton, our consulting endocrinologist, for his helpful suggestions and aid in diagnosing these cases.

the poor. She became unmanageable and was taken to a sanitarium where she remained for three months and was classified as a case of dementia praecox. She improved, was sent home, and evidently made a good adjustment. She married, bore four children, and remained well until November, 1935, when she was hospitalized with recurrent symptoms of hyperthyroidism. On February 19, 1936, a subtotal thyroidectomy was done and the pathological diagnosis was that of "diffuse parenchymatous goiter with iodine involution."

On 10/13/36 the patient developed mental symptoms. She became disturbed, neglected her work, thought she was going to die and complained of pain in the stomach; wanted to go outdoors at two o'clock in the morning; said someone was going to burn the house down, stared into space, and so was committed.

Upon admission she weighed 186 pounds. Heart was slightly enlarged. She did not cooperate very well for the physical examination. Laboratory reports were negative.

The patient was very resistive, negativistic, and refused to get off the floor. At times she mumbled to herself in an inaudible manner. Tube-feeding was necessary on several occasions. A formal mental examination coud not be made as she was uncommunicative. She was classified as dementia praecox, undetermined type.

After a few weeks stay a non-pitting edema of the ankles was noted, together with a swelling of the face. Blood chemistry and urinalysis reports negative. A tentative diagnosis of myxedema was made in February, 1937, and the patient was referred to the endocrine clinic, where the diagnosis of myxedema was confirmed.

Laboratory reports were as follows: Blood sugar was 67; N.P.N. 32; chloesterol 221. Erythrocytes 4,100,000; leucocytes 13,000; neutrophiles 85 per cent.; lymphocytes 15 per cent. Glucose tolerance (1) 86. (2) 88.4. (3) 106.3. (4) 114.9. (5) 123.4. (6) 94.7.

The patient was placed on thyroid extract, grs. 3, daily; finally increased to grs. 4. Under this dosage the marked puffiness of the face disappeared; she became more alert and associated with others and assisted with the duties in the cottage. In May, 1937, the patient was apparently in good mental state. She appeared to be recovered from her psychosis; still received four grains of thyroid extract daily. Paroled on 5/27/37 and evidently adjusted quite satisfactorily and was discharged three months later as improved.

COMMENT

This woman's mental symptoms followed thyroidectomies. The psychosis evidently was similar to the reaction pattern of a schizophrenic. We know very little about the first attack but it also developed following a goitre operation. The patient had marked signs of myxedema, associated with a psychosis, and under appropriate thyroid medication she improved, both mentally and physically. Her B.M.R. was plus-16 at the time of her parole.

Case 2. A white woman, aged 49; admitted 5/14/37 because of auditory hallucinations. A brother died of tuberculosis; and maternal grandaunt was mentally deranged. Patient had an attack of dropsy several years prior to admission. She had a high school education and worked as a secretary until marriage at 26 years; and later bore four children. Was considered a friendly person who got along well with everyone.

Onset of mental illness occurred in 1925. At that time she would open the windows wide, dress in her coat and keep the gas burning to counteract the air coming through the windows. She said she did this to offset the "breath of poison" her husband was using on her. She seldom went outdoors. In 1929 after receiving care for a neuritis by a physician, she accused this physician of being the cause of her condition at that time; claimed that she was going to collect $100,000.00 for the way he had treated her. When she fell downstairs, splitting her knee cap, she claimed that the physician was behind her, chasing her. She became more delusional; saw many pictures on the walls, calling them "silhouettes." Said her body had a disagreeable odor because the doctor gave her sheep's ovaries during her menopause, also the doctor had hypnotized her. She frequently heard the voice of this doctor and his wife, who at the time were dead, and talked back at them. For some time prior to her admission she had been unable to do her housework.

Upon admission she weighed 137 pounds; heart tones were weak and distant; blood pressure 130/90. There was a non-pitting edema of the ankles; loss of hair of eyebrows, eyelids and pubes, with a pale, dry skin. Blood sugar was 100; N.P.N. 30.5; creatinin 1.5. Urine showed a trace of albumin. Wassermann was negative; hemoglobin 67 per cent.; erythrocytes 3,550,000. B.M.R., 36%.

The consulting endocrinologist's report was as follows: "The skin is dry and shiny over the right forearm and hand. The skin over the rest of the body is quite dry and inclined to scale. Absolutely no hair on the forearms, legs, or in the axillae. The left brow is almost entirely gone. There is a narrowing of the palpebral fissure. Has typical myxedematous voice. recommend thyroid therapy.

Patient's speech was slow and she talked in a low tone, almost a monotone, making her conversation inaudible. She expressed numerous delusional ideas concerning the physician who had treated her many years ago for menopause. She said he had shriveled her until she resembled a mummy by giving her injections. Diagnosis "paranoid state (involution and hypothyroidism)." Thyroid extra, grs. 2, daily, induced nausea and palpatation, so the dosage was reduced to 1 gr. daily.

At the time of this writing the patient has shown improvement, physically. She has recently begun to sweat and to grow hair on her arms. Her voice is much higher in pitch and she volunteers the information that her tongue feels smaller. She is in good contact, superficially, but still hears voices calling her names. The B.M.R. is still —20 per cent and she

is to be tried on larger doses of thyroid again and is to be given antuitrin twice daily.

COMMENT

A woman of normal temperament, approaching the involutional period, developed a psychosis, characterized by poorly systematized delusions of persecutions, accompanied by physical and metabolic signs of myxedema. Appropriate medication improved her physical condition.

Case 3. A 44-year-old woman, admitted 2/17/32; single, domestic by occupation, and of limited education. Seventeen years prior to her admission she underwent a series of operations—appendectomy, ovarectomy and cholecystectomy—followed eight years later by a thyroidectomy. She suffered heart attacks from 1927-1932.

Onset of mental illness was noted in 1931 when she became quite irritable, was slow in movements, and unable to do housework. In 1932 she complained of dizziness, had fainting spells, was extremely tired, and unable to stand. In February, 1932, she "turned cold," seemed helpless, refused to talk or feed herself, "acted as if she were delirious," was depressed, and at times talked of dying.

Upon admission physical examination revealed a poorly nourished, anemic white female, weighing 104 lbs., height 64 inches. Subnormal temperature. The skin was pale, dry and scaly. Speech was thick. There were fine rales audible in both apices posteriorly. Blood pressure was 92/68; pulse 72; skin cold; reflexes normal. Erythrocytes 3,400,000; hemoglobin 61%; leucocytes 4,100. Blood chemistry was normal except for blood sugar of 58.8 mgs.; urinalysis negative; blood and spinal Wassermann negative. Phenosulphthalein test revealed output of 40% the first hour and 33% the second hour, or a total output of 73.3%. Ewald meal revealed a total acid of 17 with free HCL of 4. X-ray confirmed the diagnosis of incipient pulmonary tuberculosis.

During the mental examination the patient said that she was weak and complained of the numerous examinations. Orientation good. Memory fairly good except for a period of ten days prior to her admission to the hospital. General information poor. Calculation poor. Psychological tests revealed a Babcock deterioration rating of —4.1 with a vocabulary I.Q. of 95. Because of the slow, gradual onset, impaired responses to test, evidence of deterioration, and speech defect, she was classified as psychosis with organic brain disease. For about a year the patient was confined to the tubercular pavilion and ran an occasional afternoon temperature up to 99 degrees for a period of three months.

In 1934 she developed a severe menorrhagia but pelvic examination was negative. Mentally, she continued to be suspicious and irritable, refused to mix with people, and said she could not trust them. In 1935 she continued to be suspicious and paranoid, believing people were trying to make her unconscious. In 1936 she was irritable, complained of feeling tired, and was sent to the hospital ward for a check-up because of pasty skin and weakness. Examination revealed coarse, black hair, nonpitting edema of lower eyelids and ankles. No other physical findings. B. M. R. was —42, confirming the impression of hypothyroidism with myxedema. Patient has been under thyroid continuously and now her B. M. R. is —20. A deterioration scale shows an index of —3.6 and a vocabulary I.Q. of 107. Her physical condition has also shown improvement.

CONCLUSIONS AND SUMMARY

1. Three cases of myxedema with psychosis are reported, and the variation in reaction pattern is attributed to differences in hereditary, constitutional, and environmental background, as well as organic conditions.

2. Young individuals who develop myxedema and who possess a schizoid personality are prone to develop schizophrenic psychoses.

3. Elderly patients with involutional and cerebral arteriosclerotic changes are apt to develop an organic psychosis, characterized by a loosely constructed paranoid delusional system, with confusion and vague hallucinatory experiences.

4. Appropriate thyroid therapy may improve the physical, and possibly ameliorate the mental condition.

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DISCUSSION

James H. Hutton (Chicago): The interesting thing to me is that while endocrinopathies in general are extremely widespread in Elgin, and I believe in other institutions also, hypothyroidism is a relatively infrequent finding. The number of cases reporting hyperthyroid states are even more infrequent. I have seen only two or three in the last seven years out there.

Undoubtedly the level of thyroid function has a profound influence on the mental as well as the physical state, the hyper state associated with the speeding of mental processes and the hypothyroid level with the retardation. I wish Dr. Simon could have shown pictures of patients he described. It would have brought out the ease of diagnosis in some cases and

the great difficulty in others. If I recall one of the cases correctly, the diagnosis could be easily made. It was a typical picture of myxedema; whereas the picture Dr. Wiltrakis showed did not look like hypothyroidism.

Quite low basal rates are found not in association with hypothyroidism. Low basal readings may be found with other endocrinopathies, particularly pituitary or adrenal insufficiency. Or the rate may be quite normal where the thyroid level is quite low. So the basal rate presents only one factor in the diagnosis and one cannot make the diagnosis dependent on one factor alone.

At Elgin we followed the blood cholestrol in several cases. In only a few cases as the level of the thyroid function went down, the blood cholestrol went up. Where you do find a high cholestrol level, it speaks for hypothyroidism but it may be present without that. The dosage of thyroid in these cases is one that can be determined only by trial. Frequently patients with basal rates of minus 30, obviously due to hypothyroidism, are yet able to tolerate doses perhaps not more than two grains per day of thyroid. The patient with a normal rate, the thyroid deficiency being combined with pituitary deficiency, may be able to take three times that much.

The best procedure is to start out with a relatively small dose and increase or decrease the dose about every five days until the patient's tolerance is found. The final test of all these things is whether the patient takes thyroid well and gets better; not better mentally because he may not, but better physically.

I have seen cases that were mistaken for hypothyroidism because of a low rate, asthenia, slow pulse and a low blood pressure, and yet they were not cases of hypothyroidism, or at least the thyroid was a relatively innocent factor in the case. They had a pituitary and adrenal deficiency. Those two things will produce readings quite as low as any hypothyroidism I know about. A therapeutic test is usually the thing that will tell whether the thyroid is at fault. If it is, the patient will tolerate a reasonable amount of thyroid and as the B. M. R. approaches normal, he coincidentally will feel better. If it is due particularly to adrenal deficiency he will feel much worse long before the basal rate approaches normal. He will have heart consciousness, be nervous, and generally feel much more miserable. In these cases Dr. Wiltrakis followed, these patients physically were much bettter. I think these myxedema cases were also better mentally.

Unfortunately while endocrinopathies in general are extremely common, in at least one institution, correcting the endocrinopathy does not always favorably influence the mental state. They may be as disturbed mentally when the endocrinopathy is corrected as before treatment was presented.

Freshman (preparing an essay): "What do they call those tablets the Gauls used to write on?"

Roommate: "Gaul stones."—*Kentucky Grocer.*

CERVICAL FASCIAE AND INFECTIONS ABOUT THE NECK

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CHICAGO

This paper merely attempts a brief review of the anatomy of the neck with especial regard to the progress of suppurative processes as affected thereby. Much has been written in this field and on this subject and it is in the belief that repetition is one of the surer paths to true knowledge that this topic is given. The varied anatomical descriptions given the fasciae of the neck and their multiple classifications is evidence of their rather complicated structure. The fact that one of the most difficult cases to diagnose and handle is pus in the neck; that fatalities still occur, that the neck is an admittedly difficult surgical area—all serve to make this a problem of never-ending interest. Though a bibliography is appended, no attempt is made to credit the various works individually. Quotations are not used, since many of the authors mentioned have borrowed from one another. Some of this work is original in that the drawings shown are free-hand taken from specimens of horizontal serial sections of the neck and head in the anatomy laboratory of Loyola University.

If one does not overburden himself with pseudodescriptive terms and too-detailed an inquisition into the fasciae and compartments of the neck, a clinical understanding and application is easily made out. This is readily seen if, in our primary division, we divide the neck into an anterior or visceral half and a posterior or muscular half. This is best viewed in the section through the fourth and fifth cervical vertebrae, which almost every textbook shows in describing the cervical fascia, and which most of you are familiar with.

It will be seen here that the so-called prevertebral fascia binds together the muscles immediately about the cervical spine, and at this level separates them from the inferior constrictor muscle; this creates a potential space.

The Retropharyngeal Space. The extent of this space and the avenue it presents for the spread of infection may be seen if one carefully disarticulates the head from behind and carries the section forward through the prevertebral

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fascia to the retropharyngeal space, when the head will topple forward and downward, carrying with it the anterior or visceral half. This space extends directly downward into the mediastimum and is filled with loose areolar tissue in which are embedded the retropharyngeal lymph glands which, in children at least, are so prone to break down with the production of an abscess. Since this is separated from the pharynx only by mucous membrane and the constrictors, spontaneous perforation is frequent; or the examining finger, in palpating the posterior pharyngeal wall for fluctuation and diagnosis, ruptures the abscess. If incision in the posterior pharyngeal wall is required it is performed without anesthesia—the child merely being wrapped in a sheet and inverted immediately after incision to prevent aspiration of the pus, although use of a mechanical aspirator will obviate the need of this procedure. An external approach into the retropharyngeal space may be had through its side, where the carotid sheath, together with a prolongation of fascia anteriorly, called the *alar fascia* definitely walls off any lateral extension of pus confined in this area.

This approach calls for an incision along the anterior border of the sternocleidomastoid muscle, below the level of the hyoid bone, and extending a sufficient distance downward (usually to about the level of the cricoid). The sternocleidomastoid muscle and carotid sheath are retracted laterally putting the alar fascia on the stretch, which in this area, i. e., below the hyoid, is practically devoid of vessels. Blunt dissection through this fascial sheet introduces one immediately into the retropharyngeal space.

This same approach, with the incision extended further downward, and with division of the posterior belly of the omohyoid, may be used in inspection as low as the third thoracic vertebra or, for example, for delivering foreign bodies impacted in the esophagus. From the previous slide it will be seen that pus from a cervical caries or Pott's disease is not located in the retropharyngeal space, though it may penetrate the prevertebral fascia and be evacuated, as described above, for true retropharyngeal abscess. It may, however, burrow downward in the midline, keeping beneath the prevertebral fascia, until it becomes mediastinal in location or, as is quite frequently the case and explained by this next slide, follow the lateral extensions of the prevertebral fascia over the scalene muscles, and present a bulging in the posterior triangle of the neck which may be incised and drained to advantage in this region, since secondary contaminating organisms are more easily controlled than is the case in an incision in the pharynx.

Since the attachment of the prevertebral fascia superiorly is to the occipital bone (about the insertion of the longus capitis), it follows that the pointing of an abscess from the petrous apex into the pharynx would be anterior to the prevertebral fascia or in the retropharyngeal space.

The carotid sheath is a condensation of connective tissue about the great vessels in the neck and represents a line of fusion of the three major fascial layers of the neck. It is often depicted as the stem of a trifolium in which the leaves are the potential spaces which so frequently are the sites for the accumulation of pus in cervical infections. This is not entirely true, for the carotid sheath cannot be likened to a hollow stem or tube, though pus under great pressure in the above-mentioned spaces may, by perivenous extension, extend to and down the internal jugular vein.

The parapharyngeal, lateral pharyngeal, or pharyngo-maxillary space, as it is variously called, is the most commonly found infected of this group. Etiologically, local tonsillectomies are often concerned, since parapharyngeal space abscess is the most frequent complication of its class following this popular surgical procedure. This space is bounded

Internally, or medially, by the superior constrictor muscle of the pharynx and its associated buccopharyngeal fascia;

Externallyl, or laterally, by the internal pterygoid muscle, the parotid gland, and the ascending ramus of the mandible;

Anteriorly the sub-maxillary gland;

Posteriorly the stylopharyngeus muscle and fascia covering the great vessels and nerves;

Superiorly the floor of the skull; and

Inferiorly it diminishes in size to a point or apex continuous in the carotid sheath at the level of the greater cornu of the hyoid bone.

Descriptions of the space vary; some including the great vessels in the compartment, but dividing it into two halves—an anterior in which the pus is found, and a posterior separated from the anterior by the styloid process and attached muscles and ligaments, and containing the great

vessels. Of clinical importance is the fact that it lies at the level of the tonsil and so, besides causing external swelling behind and below the angle of the jaw, usually displaces the tonsillar fossa, pillars uvula, etc., medianward, much in the same fashion as a peritonsillar abscess. Relief by surgical drainage may be accomplished by

Internal drainage—usually effected by thrusting a curved blunt hemostat through the tonsillar fossa. The advantages over external drainage are cosmetic, but are often outweighed by; the patient's inability to open the mouth due to trismus produced by direct irritation of the internal pterygoid by the abscessed space; the difficulty or impossibility of controlling hemorrhage, great or slight; the tendency of the opening to close before drainage is complete.

External drainage may be effected by a skin incision over the greatest point of swelling; location of the abscess by an aspirating needle; and then blind, blunt dissection until pus is reached, when a tube may be inserted. Other techniques include an incision just below the border of the mandible, ligation of anterior facial vein to permit rolling the submaxillary gland up out of the way on the mandible, and blunt dissection medialward into the parapharyngeal space. Another mode of access is through an incision along the anterior border of the sternocleido mastoid muscle which, on lateral retraction, exposes the carotid sheath. A gloved finger carried up the sheath will find the abscessed parapharyngeal space.

The other two spaces depicted by the trifolium are the

Submaxillary space and the

Parotid space—both of which are formed by a splitting of the outer investing or vaginal layer of the deep cervical fascia, which also splits to enclose the sternocleidomastoid and trapezius muscles.

The submaxillary space is complete, and when found to be housing pus, usually represents an abscess of the salivary gland itself and may be demonstrated by milking pus through the duct opening in the floor of the mouth. Relief is found only in total extirpation.

The Parotid space besides containing the salivary gland also includes some superficial or preauricular, and some deep lymph nodes. The medial or internal layer of its fascial layer is incomplete superiorly and permits communication with the parapharyngeal space, but inferiorly reinforcement presents a strong band known as the stylomandibular ligament which very effectively separates the parotid from the submaxillary space.

From the above it is readily seen how an exposure of the carotid sheath, through an incision along the anterior border of the sternocleidomastoid at the level of the hyoid bone, serves a double purpose i.e., it allows easy and almost blind access to the three spaces and at the same time permits inspection of the internal jugular vein which may be thought to be thrombosed.

An additional space—the *Suprasternal space,* or space of Burns, is found low in the neck as a communication between the space on either side formed by the splitting of the investing layer of fascia about the sternocleidomastoids.

It is of little surgical importance, containing the terminations of some smaller cervical veins, viz., the anterior jugulars, external jugulars, transverse cervical, etc.

A space of more importance is the so-called *Subvaginal space,* found directly beneath the ininvesting layer in the posterior triangle, and beneath the sternocleidomastoid muscle in the lower part of the neck. It does not extend into the anterior triangle, nor do the two spaces communicate across the midline. They communicate, across the midline. They communicate, in pressure experiments, behind the carotid sheath with the retropharyngeal space. The importance of this space lies in the large number of lymphatic glands it contains.

The parapharyngeal, lateral pharyngeal, or fascia is a rather ill-defined layer which, at its middle, is attached to the hyoid bone and an oblique line on the thyroid cartilage. Superiorly it covers the muscles forming the floor of the submaxillary triangle, and so gains attachment to the mylohyoid ridge. Inferiorly it is continued over the infra hyoid group of muscles, the trachea, esophagus and thyroid down into the mediastimum. That portion covering the infrahyoid musculature is attached anteriorly to the manubrium sterni, and laterally it is continued over the posterior belly of the omohyoid to the attachment of that muscle on the superior border of the scapula. The space formed between it and the outer investing layer is demonstrable for the most part above the hyoid only

where it contains the submaxillary and submental groups of nodes. This explains too, cases of so-called Ludwigs angina, or abscesses about the base of the tongue originating above the mylohyoid line which, spreading downward, involve the mediastimum if they succeed in passing the general partition which the hyoid bone, together with its muscular and fascial attachments makes, separating the neck into upper and lower halves. It may be pointed out here that the hyoid bone is the agent by which the visceral structures are slung between the styloid process and mandible above, and the sternum below, by virtue of the supra and infrahyoid strap muscles.

External to the investing layer of deep fascia is the superficial fascia containing the platysma, the external jugular veins, and a quantity of fat and lymph nodes. Pus here reaches the surface with ease, and is represented principally by the suppurative lymph adenitis found especially in childhood and observed but rarely in adults. Posteriorly, numerous fibrous septa so divide and fix securely this subcutaneous element that it is a favorite site for carbuncles when solitary localization, relieved by a small single opening, is entirely inadequate.

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DISCUSSION

Dr. Carl Christoph, Chicago: After listening to Dr. Kerwin's excellent paper, I do not believe that there is much further to be said on "The Suppurations of the Neck" so far as anatomy is concerned. The doctor has done a lot of work on the subject and I am sure he has cleared up a lot of questions as to anatomy as well as nomenclature of the structures of the neck.

I should like to mention, however, in connection with the deep infections of the neck, that the most dreaded complications are edema of the larynx and mediastinitis. Treatment is divided into medical and surgical. In medical treatment, sulphanilamide and prontosil have come into use recently, and x-ray applications are very valuable. One drug that we do not hear so much about is calcium gluconate. I think we have saved many lives with its use, intravenously and intramuscularly. We now do fewer tracheotomies.

Concerning the infection that travels along the deep fascia into the mediastinum, in my opinion surgery is indicated. Together with the leucocyte count, the temperature variations, etc., the most important point is the deep tenderness over the vessels and the posterior border of the thyroid gland. Of course, an exact knowledge of the anatomy is necessary in order to do this surgery.

Dr. Lindon Seed, Chicago: Dr. Kerwin has presented a useful and accurate description of the fasciæ of the neck. Most operations for infections of the neck are blind affairs. Usually one cannot find the fascial planes or the anatomic landmarks; all that he encounters is granulation tissue, blood and trouble. Because the opening of an abscess is largely a blind procedure, knowledge of the involved anatomy becomes more necessary than usual. If one walks about a room with his eyes open he does not need to know the position of each and every structure within it. If he walks about it with closed eyes it is imperative that he know it exceedingly well.

As a matter of convenience I divide infections of the neck into two main groups: first, the superficial infections arising from a suppurative lymphadenitis, usually not serious, and, second, the deep infections, which may be divided into those involving the floor of the mouth and those in the central portion of the neck. The group involving the floor of the mouth can be again divided into three types: 1. Those which lie beneath the mylohyoid muscle and present in the submental region. These are drained through a transverse skin incision near the hyoid bone and a longitudinal incision through the geniohyoglossus muscles. 2. Those which present in the submaxillary region. These require a lateral transverse incision below the jaw margin, and the submaxillary will have to be either elevated or removed to drain the pus which lies on its medial aspect. In this operation all anatomic landmarks must be recognized. 3. Those which present at

the angle of the jaw. Usually an infection in this situation is due to a relatively superficial suppurative adenitis rather than a parapharyngeal space infection. If there is much involvement of the pharynx with trismus and difficulty in swallowing or breathing, the latter is more likely. Drainage can usually be accomplished by jamming the finger or a closed forceps rather blindly into the area between the bony tip of the styloid process and the angle of the jaw.

Deep infections of the central portion of the neck are uncommon. Those that arise about the esophagus descend rapidly into the mediastinum and demand an emergency operation as soon as they are recognized. The others behave much as abscesses elsewhere; that is, they localize fairly well and are opened when one is reasonably sure that pus is present. The fear that they will spread into the chest cavity is probably exaggerated.

The individual covers all of the types of infection of the neck. Experience in the field is divided betwixt the pediatrician, the general surgeon, the dentist, the oral surgeon and the otolaryngologist. The experience of any one of these is quite different from that of the others. Most of the infections are easily handled; a few are not. The latter infections rightfully belong to the nose and throat surgeon, although they more frequently do not reach him. For this reason I think the presentation was appropriate as well as informative.

Dr. R. W. Kerwin, Chicago (closing): I want to thank all the discussors. I did the procedures suggested by Dr. Christoph yesterday before we left, which were to use both x-ray and sulfanilamide, and to see one of these phlegmonous processes subside partially at least in about six or eight hours' time following the therapeutic dosage of x-ray.

Dr. Seed has not told all he could about deep neck infections. I have listened to him on several occasions and I am sure some of his points would interest you if time allowed. One point about which we make a mistake is not using the collar type of incision. Even in the midline, instead of a vertical incision make a cross incision ,and raise a flap. The resultant scar is much nicer and does not string out. I am sure he could enlighten us on many more points.

SPONTANEOUS SUBARACHNOID HEMORRHAGE

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Spontaneous hemorrhage into the trabeculated space occupied by the cerebrospinal fluid produces a syndrome distinct enough to be regarded as an entity. It occurs with sufficient frequency for every practitioner to expect to see more than an occasional isolated case. The resulting clinical picture is so striking and so easily recognized and the tentative diagnosis so easily confirmed by spinal puncture that everyone should be acquainted with the known facts. Last but not least, proper treatment is effective.

Read before Section on Medicine of Illinois State Medical Society, May 18, 1938, Springfield.

The first description of such cases was probably that by Wilks[1] in 1859. However they were not recognized ante mortem before Quincke introduced the spinal puncture in 1891 and the clinical diagnosis was seldom made before the turn of the last century. Since then a considerable literature has developed so that at the present time we have a fairly complete idea of the mechanisms involved.

Although spontaneous subarachnoid hemorrhage undoubtedly occurs more frequently than is generally appreciated, few statistics on its incidence are available. Leopold[2] reported only three cases from the University Hospital in Philadelphia in 1929. On the other hand, Ohler and Hurwitz[3] reported twenty-four cases from the medical services of the Boston City Hospital in a period of eighteen months. During the same time there were twenty-two cases of subacute bacterial endocarditis and three hundred and fifty-three cases of cerebrovascular accidents of all types. These figures are very close to ours: six cases of subarachnoid hemorrhage, seven cases of subacute bacterial endocarditis, and ninety-four cases of cerebrovascular accidents, taken from our office records between January 1927 and December 1937. It would seem then that spontaneous subarachnoid hemorrhage has about the same incidence as subacute bacterial endocarditis and about one-fifteenth of that of ordinary cerebrovascular accidents.

The adjective "spontaneous" excludes from discussion all cases of subarachnoid hemorrhage resulting from trauma, infection, inflammation, blood dyscrasias, tumors, nevi, epilepsy, etc., because in most of these cases the reason for the hemorhage is obvious. However it is in no sense to be regarded as the equivalent of the term "idiopathic" because in every case there is a definite underlying pathological process. This process aways consists of disease or degeneration of the cerebrospinal arteries per se. Furthermore the word spontaneous is well chosen because the hemorrhage usually makes its appareance suddenly and dramatically, without evident cause, in a person previously in apparent good health.

Etiologically the cases fall roughly into two groups. In the younger group the hemorrhage

is usually due to a congenital aneurysm or defect in the vessel wall. In the older group it is usually due to arterial disease or degeneration in which hypertension is often an important factor. In the great majority of cases the hemorrhage occurs from the rupture of an artery at the base of the brain, usually in or near the circle of Willis. There are several reasons for this. In the first place these vessels have the same thin walls as the intracerebral arteries, due chiefly to attenuated muscular and connective tissue coats. At autopsy they appear thin and collapsed and almost as transparent as though made of cellophane. In the second place they are literally suspended in a large fluid space, unaccompanied by veins and without any of the customary support of surrounding structural tissues. In the third place they are of relatively small caliber and in the fourth are so arranged that their junctural points produce almost right-angled channels which must bear the brunt, especially at the emergence of the left carotid, of forceful impulses transmitted in almost a straight line from the left ventricle.

The importance of intracranial aneurysms as the source of subarachnoid hemorrhage is becoming more and more apparent with each pathological study.[4, 5, 6, 7] These dilations usually occur on the larger or medium-sized vessels at the base and almost always at their points of bifurcation where the pressure of the pulse wave is the greatest. They vary in size from the fraction of a millimeter to a centimeter or more in diameter. In young people with normal vessel walls Wiley Forbus[8] has shown that they are due to a muscular defect in the media which occurs at the points of bifurcation. This form, then, is an acquired lesion arising from a congenital defect in the muscularis. In older persons the usual cause is arteriosclerotic changes which have destroyed the elastic layer. Such aneurysms were demonstrated by Straus, Globus and Ginsberg[9] in nine out of eleven autopsied cases. It is obvious that either type of lesion may lead to rupture of the involved vessel before an aneurysm has developed. The point is that the study of autopsy material shows that the defect usually leads to aneurysmal dilatation before it does to rupture.

Syphilis does not seem to be an important etiological factor probably because the changes it usually produces in the smaller vessels are those of an obliterating endarteritis which is more likely to lead to thrombosis than to rupture. Certain it is that evidences of syphilis are lacking in the great majority of the cases reported in the literature. However in some cases intense inflammation may result in areas of necrosis which may rupture before the vessel has had time to thicken. Such changes occur most frequently in the superficial cerebral vessels in cases of dementia paralytica where repeated bleeding produces typical chronic internal hemorrhagic pachymeningitis.[10, 11, 12]

The causal relation of exertion immediately preceding an attack is of considerable interest. Active straining exertion does raise blood pressure. Thus if there is a pre-existing defect in one of the vessels such a strain may precipitate bleeding. The same may be said to a less extent of nervousness and excitement. The practical importance of this factor is obvious from a review of the cases reported in the literature. In almost all of them the bleeding occurred during the day and in the majority during periods of exertion, strain or excitement. Very few developed during periods of rest or relaxation.

Following the introduction of blood into the cerebrospinal space there begins a reaction in the meninges which is similar to that following bleeding into any other serous cavity. It is, in fact, a sterile meningitis due to the irritating effect of the blood and the products of hemolysis. As diffusion is usually rapid the reaction is usually general but varies with the amount of blood present and the length of time it is there. It tends to subside and disappear as the blood disappears from the fluid. At first there is hyperemia, edema and slight polynuclear infiltration. After a few days the polynuclear cells are replaced by round cells and finally, unless the irritating blood is removed, there is a proliferation of fibroblasts. After several weeks most of the cells disappear but if the reaction has been at all severe or continued there remains a considerable amount of fibrous tissue. Late in the course of the meningeal reaction mild inflammatory changes may also be observed in the structure of the cortex. In extreme cases where the inflammatory reaction has persisted in sufficient intensity to interfere with the absorption of the cerebrospinal fluid there may be some dilatation of the ventricles.[13]

The symptoms immediately following the escape of blood into the subarachnoid space are

due to increased intracranial pressure; the later ones to the inflammatory reaction of the meninges. Naturally they depend upon the size and rapidity of the extravasation. This may consist of simple leaking, continued or alternating oozing or a more or less large spurting hemorrhage. However, because of the nature of the pathology the onset is always definite and usually sudden. No condition in medicine is more characteristic or more dramatic than the average case. An individual in his ordinary health is stricken with a sudden, violent, vise-like headache which is followed in short order by dizziness, photophobia, nausea, vomiting and collapse. On examination there is rigidity of the neck and back and limitation of straight leg raising, without gross evidence of cerebral localization. With large hemorrhages there are often convulsions and unconsciousness. With smaller hemorrhages the initial symptoms are followed by dullness, drowsiness and delirium. When the hemorrhage is slight the most important symptoms develop after an interval of a few days and are due to the reaction of the meninges. In those cases where a slight localized leak precedes the real bleeding prodromal headaches and even local neurological findings may be present for a few hours or even days. Even with small hemorrhages there is sometimes a brief loss of consciousness which has been attributed to the actual shock of the vessel rupture, comparable to the brief unconsciousness which may occur in cerebral concussion.

The meningeal reaction begins within a few hours. Its manifestations are those of a low grade meningitis and appear directly on the heels of the initial symptoms. There is headache, drowsiness, a tendency to confusion or delirium, elevation of temperature and pulse and postcervical rigidity and positive Kernig signs. There is also a leucocytosis, usually mild but occasionally marked. For some reason Korsakoff's syndrome tends to be present in most of these deliriums to a greater or less extent. This has been suggested as a diagnostic point[14] as it is not often observed in other types of intracranial hemorrhage. The reflexes vary and may be hyperactive, reduced or absent. In some cases examination of the fundi may show papilledema or hemorrhages. The urine occasionally shows albumin and glucose. One case was seen because the question of diabetic coma was seriously considered. The presence of glucose in these cases may be the result of a mechanism similar to that occurring in Claude Bernard's classic punctures of the fourth ventricle. These manifestations gradually subside as the blood is absorbed.

The course of the disease like its symptoms depends upon the size and duration of the initial hemorrhage and whether or not this is followed by oozing or renewed bleeding. Recurrence of bleeding with coincident recurrence of signs and symptoms is fairly frequent. This may occur during the initial attack in the character of a relapse or it may take the form of repeated attacks after a period of convalescence or after apparent full recovery. However, most of the recurrent hemorrhages occur within a few days of the initial bleeding, that is, before the clot in the rent has had time to organize. Several such recurrences may occur before a final fatal attack. Small amounts of blood are undoubtedly absorbed in one or two weeks. Larger amounts may take two or three times that long. The meningeal reaction naturally takes much longer to subside, often persisting for several weeks after the spinal fluid has become free from blood.

The diagnosis of spantaneous subarachnoid hemorrhage is usually easy provided the condition is thought of and a spinal puncture done. The great majority of cases occur in people who have regarded themselves as well and the sudden onset of severe headache followed by vertigo, nausea, vomiting and collapse, accompanied by cervical rigidity and Kernig signs and the almost total absence of manifestations pointing to focal disorganization of the central nervous system leaves little doubt as to the condition present. Such a picture demands lumbar puncture just as certainly as hematuria demands cystoscopy. The spinal fluid is under pressure, is uniformly pink to dark red or orange in color, depending upon the amount of blood present, and on settling or centrifuging the supernatant fluid is xanthochromic. Hemolysis begins in a few hours after the initial hemorrhage so that, unless puncture is done immediately, some xanthochromia is always present. Subsequently this becomes more and more marked and if the puncture is not done until late the fluid may no longer be bloody but only xanthochromic. At first the number of leucocytes is proportional to the number of red cells, then the number becomes slightly increased,

at first from an increase in the polynuclear cells, later from an increase in the lymphocytes.

Traumatic blood in the spinal fluid from the puncture itself is usually easily distinguished. It is not evenly mixed with the fluid. The first tube is the darkest and if enough blood is present it will clot. Successive tubes become lighter and lighter. Finally the supernatant fluid is always clear. As a matter of fact, hemorrhage from spinal puncture is really quite uncommon. It can only occur if the needle is pushed too far and so strikes the venous plexus on the anterior wall of the vertebral canal.

The diagnosis may be further contributed to by the history or knowledge of previous attacks, or of hypertension, or the presence of general arterial disease. However some caution must be used in interpreting the blood pressure readings at the time because hypertension is an almost invariable response to increased intracranial pressure.

The identification of the nature of the vascular defect producing the hemorrhage is difficult and often impossible and yet it should be considered. In older people with evidence of arteriosclerosis and a history of hypertension the presumption is that it is due to the rupture of an arteriosclerotic vessel. In younger individuals with normal vascular systems the presumption is that it is due to the rupture of an aneurysm. In the postmortem room aneurysms of one or more of the cerebral arteries is a relatively common finding, probably occurring in about one per cent. of the cases in which they are sought, and yet in the past when considering at the bedside the causative possibilities in a given patient such aneurysms have rarely been suggested. Because of the easy compressibility of adjacent structures intracranial aneurysms which do not rupture seldom give rise to "tumor" symptoms but because so many of them do rupture they cannot be said to be entirely asymptomatic. From the standpoint of hemorrhage it may be said that they tend to give rise to longer prodromal symptoms, especially headache which is often unilateral and may be of some localizing value; that bleeding is often accompanied by focal signs, particularly palsies of the extrinsic occular muscles; that changes in the optic fundi, particularly hemorrhages about the disk, are common: and that multiple seizures at varying intervals usually precede the fatal issue. Such diagnoses have been made in the past and there is no reason why they should not be made more frequently in the future.[7, 15]

Spontaneous subarachnoid hemorrhage may be confused with almost any lesion of the brain from meningitis to tumor. Slight hemorrhages with indefinite clinical manifestations often precede large or fatal hemorrhages and hence must be considered in the differential diagnosis of any obscure lesion of the brain. In some cases the disturbances due to the blood in the cerebrospinal fluid must be cleared up before the primary lesion can be recognized. Ordinarily the chief difficulties arise in attempting to differentiate intraventricular hemorrhage, cerebral hemorrhage which has ruptured either into the ventricles or through the pia into the subarachnoid space and traumatic meningeal hemorrhage. In the latter condition the history is all important, in the former evidence of cerebral localization may be the only distinguishing feature. In comatose patients it is usually impossible to differentiate a large subarachnoid hemorrhage from a cerebral hemorrhage which has ruptured into the ventricles or into the subarachnoid space. Such cases are indistinguishable except at autopsy.

The prognosis in spontaneous subarachnoid hemorrhage must always be guarded. The average mortality of the cases reported in the literature is between 40 and 50%. The usual cause of death is increased intracranial pressure. With large hemorrhages death may occur quickly but it is never instantaneous. In cases which have recovered there is always the possibility that they may bleed again. On the other hand, it must be remembered that the literature naturally abounds in cases which have been completed by autopsy and from our experience, at least, it would seem that the average case has a better outlook. The majority of the young or relatively young, uncomplicated cases recover completely and remain well. In general it may be said that the prognosis is twice as bad in the older as in the younger group, that it is worse in proportion to the associated disease and that it is worst of all with hypertension. In gauging the individual case the most valuable guides seem to be the depth of the coma and the other evidences of increased or increasing intracranial pressure. All of our patients have been followed to April of this year. All are living and none

have had recurrences. Four are perfectly well as far as their original condition is concerned after intervals of one and one-half to six and a half years (Nos. 1, 2, 4, 6). One (No. 3), the only syphilitic, was symptomatically well and working after five years. One (No. 5) has since had a hemiplegia.

Treatment has three objectives: control of the bleeding, relief of intracranial pressure and removal of the irritating blood. In every case two stages must be observed because they require different management. The first stage is the period where the bleeding is actively proceeding. The second is that after the bleeding has stopped.

During the stage of active hemorrhage the patient should be kept rigidly recumbent with the head and shoulders slightly raised and under the influence of sufficient sedatives to insure absolute quiet. Here morphine is undoubtedly the sedative of choice as it is in other types of internal hemorrhage. The neck should be kept straight and free from any pressure. The rise in the intracranial pressure due to the slightest pressure on the jugular vein of one side, as seen in the Queckenstedt test, is instantaneous and gives a very obvious reason for these directions. If the blood pressure becomes very high intravenous injections of fifty per cent. glucose or succrose may be used or venesection may be tried, though the latter is theoretically dangerous since it may reduce the pressure in the cerebral veins below that in the cerebrospinal fluid. During this stage the increased intracranial pressure is protective and spinal puncture should not be done as sudden lowering of pressure may result in renewed hemorrhage. However, if the rise in the intracranial pressure continues and seems to threaten life, spinal puncture may be done despite its dangers as an emergency measure. The headache, mental state, blood pressure, slowing of the pulse and papilledema are the guiding factors determining the need and frequency of these procedures.

As soon as it is felt that bleeding has stopped spinal puncture should be done and the fluid removed slowly. Any spurting should be quickly controlled with the stilette. It is not wise to remove too much fluid the first time. If a manometer is available it is well to stop when the original pressure has been reduced about one-half. Subsequently this should be repeated every twenty-four to forty-eight hours depending upon the relief afforded, the pressure the fluid is under and the amount of blood present. Taps should be continued until the fluid is normal. It is probable that the late dangers of chronic arachnoiditis, such as persistent headache, mental changes and epilepsy, are not great and that absorption of some blood always takes place, but it is obvious that every effort should be made to drain off the free blood as rapidly as possible and thus prevent or reduce the resulting meningeal irritation and subsequent inflammation. If this cannot be accomplished by puncture alone the more radical procedures of decompression should be considered.

It is interesting to note the type of headache from which relief can be expected by puncture. This is usually occipital in position and though it may be spoken of as pain, is, on closer analysis, more of a feeling of intense pressure or numbness. The more neuralgic types of headache are usually the results of meningeal irritation and are not much relieved by puncture.

The necessary period of complete quiet in order that the rent in the vessel may completely heal may be arbitrarily placed at about six weeks. During this time as well as subsequently there can be no doubt that it is supremely important to keep the blood pressure as low as possible. Any strong or straining exertion should be intradicted indefinitely.

CASE REPORTS

No. 1 (16,062). A housewife, age 47, who had gotten up at 1 A.M., August 9, 1931, to watch a noisy party next door, fell unconscious. She roused a half hour later to complain of "terrible" pain all over her head and down the back of her neck. She vomited several times. Her physician made a tentative diagnosis of epilepsy, gave her a hypodermic and retired from the case. When seen in the afternoon she was drowsy, with a definitely stiff neck and questionable Kernig signs. Blood pressure 155 systolic and 85 diastolic. Arteries normal. The margins of the right disk seemed slightly blurred. On the 10th she was worse, with a very stiff neck and legs and slight mental confusion. Spinal puncture on the 11th gave a uniformly dark red, bloody fluid containing 200,000 red cells and 42 white cells per cmm. Serological tests for syphilis were negative. On the 17th the fluid was slightly less bloody, containing 75,000 red cells and 330 white cells per cmm. On the 22nd the fluid was clear, light yellow in color and contained 11 cells. Her temperature, which had ranged between 101 and 102, dropped to normal, but she remained weak and confused, with various aches and pains and a mild delirium during which she took innumerable imaginary journies. During the latter part of September she

had an unexplained temperature of 103 to 104 for two weeks. She was discharged from the hospital in good condition October 29th. In 1933 her blood pressure varied between 175 and 206 systolic and 100 and 120 diastolic. In 1937 she began to have mild anginal attacks. When last seen in March, 1938, she felt quite well except for a recent cold. Her pressure was 150 systolic and 82 diastolic.

No. 2 (St. John's 139,324). A single American girl was sitting on the parlor sofa with her beau on the night of October 28, 1932. In moving about, she seemed to bump her head slightly and immediately complained of severe headache which was followed quickly by nausea, vomiting, faintness and unconsciousness. A few hours later she roused but was restless, slightly confused and continued to complain of pain in her head and neck. She was admitted to the hospital November 1st and seen in consultation on the 3rd because her condition had not improved and because her urine contained five per cent glucose and four plus acetone and diacetic acid, which suggested the diagnosis of diabetic coma. Examination showed a drowsy, slightly delirious young woman with a very stiff neck and marked limitation of straight leg raising. Except for absence of reflexes the remainder of the examination, including the fundi, was normal. Her temperature had averaged about 100. The leucocytes were 9,200. A blood sugar 91 mgm. %. Spinal puncture gave a pink fluid under pressure which showed 750 red corpuscles per cmm. There was rapid improvement. Another puncture was done on November 5th and she was discharged on November 11th. She remained well and active for five years. In the fall of 1937 she developed pulmonary tuberculosis and at the present time is in a sanatorium.

No. 3 (17,604). A white office clerk, age 38, was seen April 15, 1933. He had contracted syphilis at 16 and been treated for some time. He had complained of headache each morning for three days. On the afternoon of April 14th he fell unconscious while at work. He roused in ten minutes and was taken home in an automobile. He vomited incessantly. The physician called made a diagnosis of gastritis and administered a hypo. When seen the next day he was confused and irrational. His pupils were unequal, irregular and fixed. His neck was stiff. His blood pressure 116 systolic and 76 diastolic. A spinal puncture gave a uniformly bloody fluid. The serology for syphilis on both the blood and spinal fluid was four plus. The colloidal gold curve was 5555544322. The next day he was worse, with a very stiff neck and bilateral Kernig signs. The spinal fluid was a darker red. Subsequently he was punctured daily, the fluid gradually becoming less bloody, so that by the 24th it was clear and golden yellow in color. By this time the stiffness of his neck and the limitation of straight leg raising had disappeared, but he remained confused, disorientated and at times actively delirious. On May 10 he was transferred to the State Hospital at Jacksonville, where he was inoculated with malaria. By the middle of July his condition had so improved that he returned to work. He is still at work and regards himself as well.

No. 4 (17,977). A German coal miner, age 43, blew his nose very hard on October 3, 1933. He immediately experienced severe pain about both ears which spread into the back of the neck, became very dizzy and vomited. He was able to come to the office next morning, where examination was negative except for marked cervical rigidity and some unsteadiness of his gait. He was admitted to the hospital, where eight spinal punctures were done. The first three were uniformly red to pink, the last ones clear and only slightly xanthochromic. Serology for syphilis negative. He was discharged in good condition October 16th.

No. 5 (18,198). An obese American housewife was taken with severe headache as she started to get out of bed December 26, 1933 . She was unconscious fifteen minutes. Subsequently she complained of headache and was alternatingly drowsy, restless and confused. Examination showed a stiff neck, slightly positive Kernig signs, a heart slightly enlarged to the left, easily palpable arteries and a blood pressure of 170 systolic and 105 diastolic. The tendon reflexes were absent. Spinal puncture was done on the 27th. The fluid looked like pure blood but did not clot. The cell count was 2,600,000. The next day the count was 1,500,000 and on the 29th 100,000. On the 30th she was not so well and the cell count was 210,000. On the 31st it was 170,000, on January 2nd 70,000 and on the 5th 30,000. She was discharged from the hospital January 24th. In 1935 she developed a right hemiplegia. In April, 1936, her blood pressure was 270 systolic and 185 diastolic and in September, 1937, 256 systolic and 140 diastolic. She is still doing most of her household chores.

No. 6 (20,642). A business man, age 56, was found unconscious on the floor of his office November 16, 1936. In five or six minutes he roused, vomited and complained of severe occipital headache. A physician who had adjoining offices told him he had some sort of indigestion and sent him home in a taxi. He remained in bed, complaining of headache and nausea. His temperature varied around 100 and most of the time he was confused and irrational. When seen on the 26th his neck was quite stiff and Kernig's sign positive. Blood pressure 170 systolic and 98 diastolic. The palpable arteries seemed normal. The optic fundi were normal except that the arteries appeared small and stringy. The spinal fluid was slightly turbid, reddish yellow in color, and showed 450 red cells and 150 white cells per cmm. On the 27th it was a turbid yellow color with 370 red cells and 60 white cells, and on the 28th was a clear yellow with 150 red cells and 60 white cells. By this time his condition had improved markedly and he was perfectly clear mentally. On December 2nd, while using the bed pan, he became very faint and a few hours later began to complain of pain in the back of his head and neck. The next day his neck and legs were very stiff. On the 4th the spinal fluid was bright red and contained 23,000 red cells per cmm. Subsequently a spinal tap was done daily and by the 11th the fluid was clear and light yellow in color. The serology for syphilis was negative throughout. He was discharged from the hospital De-

cember 13. The last of January, 1937, his examination showed nothing abnormal; his blood pressure was 144 systolic and 88 diastolic. He took a trip to Florida. Subsequently he has been seen every four to six months and has remained perfectly well, with a blood pressure of 144 to 154 systolic and 88 to 92 diastolic.

SUMMARY

Spontaneous subarachnoid hemorrhage occurs fairly frequently, probably about as often as subacute bacterial endocarditis.

It usually occurs from the medium-sized arteries at the base of the brain, in or near the circle of Willis.

It is always due to some change in the vessel walls. In the younger group this is usually a congenital defect in the muscular coat. In the older group it is usually arteriosclerotic degeneration. In both aneurysmal dilatation is common.

Following the hemorrhage there is a reaction on the part of the meninges which is similar to that following bleeding into any serous cavity.

The majority of cases occur in people who have regarded themselves as well.

The immediate symptoms are due to increased intracranial pressure and consist of sudden violent headache, dizziness, nausea, vomiting and collapse. On examination there is cervical rigidity and Kernig signs without gross evidence of cerebral localization.

The late manifestations are due to the irritating effects of the blood and the products of hemolysis and are those of a low grade meningitis.

The diagnosis is usually easy provided the condition is thought of and a spinal puncture done. The diagnostic feature is a uniformly bloody fluid which on standing or centrifuging shows xanthrochromia.

The condition is serious and the prognosis should be guarded, but many cases recover completely.

Early treatment is that of internal hemorrhage in general and the control of intracranial pressure. Later treatment is removal of the irritating blood by repeated spinal puncture.

Six cases with recovery are reported.

CONCLUSIONS

Spontaneous subarachnoid hemorrhage occurs with sufficient frequency to be added to our regular list of diagnoses. It produces a distinct enough clinical picture to be recognized and the tentative diagnosis can be easily confirmed or disproved by spinal puncture. The prognosis is not as bad as is generally believed. Proper treatment is effective.

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DISCUSSION

Dr. Garm Norbury, Jacksonville: We are all indebted to Dr. Herndon for bringing the subject of spontaneous subarachnoid hemorrhage before the Society. We are not accustomed to think of subacute bacterial endocarditis as at all uncommon. Yet here we have reported a type of disorder that often we never think of at all but which by the authors' statistics is as common as that type of endocarditis. This all goes to show me that I have missed cases of spontaneous subarachnoid hemorrhage, for I have no record of nearly as many patients with this as with endocarditis. On the other hand, the picture is usually so striking that it would be considered in acute cerebral situations, especially in young adults. Perhaps the fact that bloody spinal fluid is secured and that bloody spinal fluid is generally taught to mean an error in the puncture technic complicates the picture and the diagnosis. Such teaching, which is in the main correct, leads to a feeling of being disconcerted at the sight of the bloody fluid, when perhaps the fluid actually was blood from spontaneous subarachnoid hemorrhage rather than from technical error. We will have to watch our step now that we don't swing the other way and increase our frequency

of making this diagnosis as a face-saving proposition.

An extensive subarachnoid hemorrhage in a young person is a dramatic and a tragic condition. A young man of eighteen was recently admitted to the sanatorium in convulsions. History from his relatives and physicians brought out the fact of a headache two weeks previously, quite severe in intensity and about sixteen hours in duration. After that he felt as well as usual and worked throughout the day of admission. He came to town about 6 P.M. and developed a severe headache. He came in at 7:45 P.M. on March 19, 1938, and fell on the couch with severe pain in the head behind the eyes. He had had a similar attack two weeks previously. He was perspiring freely. The pain struck suddenly. He ate a light supper at home and vomited at 8 P.M. Eye grounds were pale; ears normal. At 8:30 he felt better and walked downstairs. Immediately he returned and began to vomit and clutched his head with both hands. At 9:15 convulsions began and he had involuntary urination. He said he was dying; his limbs were numb, his arms drawn up over the chest. The pupils were equal, moderately dilated. There was no Kernig sign. The condition began to clear at 10 P.M., morphine ¼ grain having been given at 9:30 P.M. He was admitted to the sanatorium at 11:30 P.M., at which time he could not be aroused but did respond slightly by moving his arms when addressed. He was well developed and well nourished. The ear canals contained a moderate amount of cerumen. Pupils were contracted and did not respond to light; slow rotating lateral nystagmus was present as well as strabismus; the eye grounds were seen with difficulty but the disc edges were apparently clear. Facial motions were symmetrical, the thyroid full, but there was no neck stiffness. The heart was enlarged to the left and forceful; systolic murmur was heard and slightly transmitted to the axilla; there was also an irregular, cardiorespiratory arrhythmia. Blood pressure was 240/110. The abdomen and genitalia were negative. The extremities were relaxed. There were no knee jerks or ankle jerks, no abdominal, epigastric, cremasteric or plantar reflexes; no Babinski, Gordon or Oppenheim signs, no clonus. Spinal and cisternal fluid were bloody. Kahn was reported negative. Other tests were unsatisfactory because of blood and small amount removed. Death occurred at 1:55 A.M.

Such situations are tragic. Dr. Herndon's paper, with results from proper diagnosis and treatment such as he secured, gives encouragement to us all by showing what can be done.

I haven't carried out my plans to elope. I found her father was planning to move and I didn't know where we'd find him when we got back.—*The American Interne.*

"As I live and breed!" exclaimed Mrs. Dionne, "I never thought he was a mathematician when I called him to deliver me."

TUBERCULOSIS OF THE CERVIX UTERI

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Cervical tuberculosis was first mentioned by Raymond, a French writer who in 1831 was describing typical tuberculous lesions of the female genitalia. Bonnet and Bulliard, however, credit Lisfranc in 1842 with the first report of this lesion. The literature from then on contained numerous descriptions until Moore in 1919 recorded 170 cases of which not more than fifteen to twenty were described as primary cervical. The frequency of this disease is shown by the occurrence of three cases in 1170 cervical lesions, or 0.26 per cent. studied by biopsy in our clinic.

Two routes of infection are recognized in female genital tuberculosis: 1. from within or descending, which comprises (a) blood stream infection; (b) lymphatic infection; (c) direct extension from the peritoneum; 2. from without or ascending, which includes extension upward by (a) direct continuity along the mucosa; and (b) by way of the lymphatics. The descending route is by far the more common. This is shown by the fact that most of the pelvic tuberculoses are secondary to foci elsewhere in the body. The order of frequency in the female generative tract is: fallopian tubes, ovaries, endometrium, cervix uteri, vagina and vulva.

Jameson, in a series of experiments carried out on virginal guinea pigs, found that ten of the eleven animals showed a definitely positive infection as shown by the tuberculin test, but that tuberculous lesions were discovered in only five. Each of these animals had been inoculated by a known strain of tubercle bacilli applied to the cervix by a tampon which was held in place for from four to eight days. One of these animals showed tubercles in the cervix in addition to the lymph node involvement common in the others. The lymph nodes most commonly involved were the iliac chain and those of the inguinal region. In no case were lesions found in the paratracheal, bronchial, hepatic or mesen-

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teric nodes. In a second series of experiments only sensitized animals were studied. The results obtained confirmed the experiments of Bakocs and Gronzou. Of the 15 animals studied, nine showed submucous lesions in the vagina, four had lesions in the cervix and one had a large tuberculous abscess in the uterus. In no case were the tubes or ovaries found involved. He concludes that these findings in the vagina, cervix and uterus can be explained only on the basis of lymphogenic spread.

To prove the origin of a cervical tuberculosis is indeed difficult. Numerous authors have quoted cases and experimental evidence to show that the infection is hematogenous. This, however, is still an unproven fact. That this is the usual method of tuberculous spread in the body must be acknowledged, but Siegel and Singer were able to obtain positive cultures in only 1.4 per cent. of 911 specimens from 422 tuberculous persons. Jameson's experiments tend to prove that inoculation may be direct. The infrequency of tuberculosis in the mates of males infected with urogenital tuberculosis, however, tends to disprove this mode. Hammer cites a case of a husband with pulmonary tuberculosis who used his sputum for lubrication at coitus. His sputum contained tubercle bacilli. His wife became infected and at autopsy tuberculous tubes were found. Until evidence is more convincing we shall probably have to consider cervical tuberculosis as secondary to another lesion in the body. By injecting the uterine lymphatics of guinea pigs, Jameson has shown that the cervix and corpus have independent lymphatic drainages and that uterine tuberculosis seldom extends below the internal os or cervical tuberculosis above that point.

Four types of tuberculosis of the cervix are recognized, the ulcerative, papillary, miliary and interstitial. Although certain clinical characteristics are described for each, the fact remains that few cases can be diagnosed except by microscope or guinea pig inoculation. In the ulcerative lesion which has a red granular base with punched out or overhanging edges, on microscopic examination the epithelium is usually absent and the deeper tissues invaded by tubercle. In the vegetating or papillomatous form which is most often mistaken for carcinoma clinically, the microscopic picture shows the fungoid vegetations covered with modified epithelium and a stroma infiltrated with tuberculous elements. The miliary form may be a part of an acute miliary tuberculosis or the early stage of any of the forms listed. Typical tubercle formation with or without caseation is found. The interstitial form is regarded as a more advanced form of the miliary. Microscopically the lesions are found to be localized in the depths of the cervical parenchyma where tuberculous nodules are seen in various stages of evolution.

The symptoms of tuberculous involvement of the cervix depend entirely on whether or not the cervix alone is involved. In those cases where a primary focus exists elsewhere in the body the symptoms of fever, cough, fatigue, weight loss, etc., are likely to overshadow the local manifestations. The age incidence in our cases was the same as those reported in the literature; the greater number occurring in the third decade of life. One of our cases occurred in the second and a few cases have been reported in the fourth and fifth decades. This fact aids in the differentiation of carcinomatous lesions which appear more frequently in patients over forty years of age. Leucorrhea is the most common symptom, having occurred in all our cases. It is usually a glossy mucoid secretion exuding quite freely from the cervical canal. Bleeding occurs especially in the ulcerating and proliferating types. It is usually contact bleeding, occurring after coitus or trauma associated with instrumentation. Frank metrorrhagia seldom occurs, while menorrhagia is usually associated with endometrial or ovarian involvement. Amenorrhea occurs in approximately 40 per cent. of cases, and was present in one of ours. This symptom, however, is usually associated with more advanced or general tuberculosis. Sterility, according to Spalding, is found to be present in over 60 per cent. of these patients. This was true in our case study. Two patients had become pregnant in early life but in both instances aborted. Pain is usually considered to be absent or slight or indefinite. In one of our cases, lower abdominal pain was complained of, but in this instance a myoma of the uterus complicated the tuberculosis.

The diagnosis in almost every instance is made by microscopic examination of tissue removed by biopsy from the lesion. The tissue removed for biopsy study should include all of the constituents of the cervix. The more advanced

forms closely resemble carcinomatous invasion of the cervix and this diagnosis was most often erroneously made. The typical tuberculous ulcer is quite irregular and has sharply demarcated edges, its floor consists of a velvety deep red granulation which at times may be covered by a dirty grey necrotic membrane. In the miliary type tubercles may be found studded over the portio of the cervix and in the interstitial form a hypertrophy and reddening of the cervix may be the only clinical findings. In this instance it is impossible to make the diagnosis without a deep biopsy. These lesions upon being disturbed do not have the characteristic free bleeding of a malignant growth. In our study the lesions were all multiple which is also unusual in a malignancy. The Schiller reaction is negative in tuberculous lesions. Colposcopic study was found to be an aid to diagnosis. The clear-cut edge and the edematous smooth base of the ulcer differ markedly from the irregular edge and granular base of an early carcinoma. On digital examination the friability of tissue and woody induration so characteristic of carcinoma is absent. In those cases where typical tubercles are not found on microscopic study, guinea pig inoculation of ground up tissue or staining the tissue or smears from the tissue with acidfast stains may be of some value. The differential diagnosis must include besides carcinoma, leutic and gonorrheal granulomata, sarcoma and extensive erosions associated with hypertrophy and eversions of the cervix.

That tuberculosis of the cervix may heal spontaneously was believed by Murphy and has been shown in one of our cases. In another case the disease spread rapidly to the vaginal walls and undoubtedly became widespread enough to cause the death of the patient. Hofbauer maintains that the disease may spread to the uterus, tubes and even to the peritoneum.

The treatment of this condition is surgical, radiological or conservative. In lesions localized to the cervix, less radical measures consist of general supportive treatment of fresh air, diet, rest and local cleanliness, with cauterization (Faure), electrocoagulation (Bonnet and Bulliard), cautery amputation of the cervix and treatment of the stump with tincture of iodine (Katz), roentgen-ray treatment through a suprapubic field (Dworzak). Spalding reports a case treated with x-ray therapy without benefit. This case was later hysterectomized and the process found limited to the cervix. In one of our cases radium was used with apparent good results. This case, however, also had a syphilitic lesion of the cervix which healed after antiluetic therapy. The radical procedure of performing a panhysterectomy is advocated by Culbertson, Danforth, Possi, Webster, Kynoch and the majority of American gynecologists. It must be remembered that extension to the vaginal walls occurs frequently and in this instance hysterectomy is of no avail.

A detailed report of our cases cannot be included in this paper due to the lack of time. They will, however, be published in detail in a later report. The three patients, all colored, were 28, 30 and 38 years of age respectively. In each case leucorrhea was the major complaint. A primary focus could not be found outside the cervix and vulva. In one case the infection spread upward rapidly and caused the patient's death. The remaining two cases are living and well at present. The one having responded to general hygienic and supportive treatment. The other having been treated by antiluetic therapy and radium. The antiluetic treatment successfully cleared up a gumma which complicated the tuberculosis in this case, and the radium healed the tuberculosis. A positive Kahn and Wassermann reaction were found in one of the other cases.

SUMMARY

Tuberculosis of the cervix is a rare disease, having occurred in 0.26 per cent. of 1170 cervical lesions studied by biopsy in our clinic. Two routes of infection are recognized, a descending and ascending. The descending is the most widely accepted, although experiments from Jameson are cited to prove the possibility of an ascending route. Leucorrhea is a constant symptom and the diagnosis must be made by biopsy. The demonstration of tubercles on microscopic section is not sufficient unless acidfast tubercles can be demonstrated. The treatment of cervical tuberculosis is surgical, radiological or conservative. Two of our cases are reported well, the one treated with radium four

years ago and the other by medical supportive therapy two years ago.

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TREATMENT OF MALIGNANCIES OF THE COLON AND RECTUM

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Marked advances have been made in recent years in the treatment of malignancies of the colon. Noteworthy factors contributing to this advance include: (1) earlier recognition and treatment of lesions made possible by educational programs to the laity, by the recognition by the profession of the importance of certain early symptoms, and by improved and more available diagnostic methods; (2) improvement in the technique of treatment whether by surgery or irradiation and the recognition of the indications and limitations of each; (3) preoperative measures directed to the rehabilitation of the patient and the decompression and cleansing of the colon; and (4) recognition of the value and rationale of multiple stage operations.

Treatment of malignancies of the colon is distinctly worth while to the patient. It is true the percentge of five-year survivals are often discouraging, particularly of the rectum, but these figures are influenced by the limits of operability set up by the surgeon. Surgical attack upon lesions of doubtful operability lowers the percentage of five-year survivals, but the occasional cure in this type of case encourages us to increase our limits of operability. Five-year survivals as reported by Pemberton and Dixon[1] vary from fifty-two per cent. in the cecum to forty-three per cent. in the rectum according to figures based on twenty years' experience of the Mayo Clinic. A careful history and examination to demonstrate the location of the growth, the degree of fixation or obstruction, and any evidence of metastasis, is imperative and influences the type of treatment used. Carcinoma of the rectum can be felt in most cases by digital examination. Growths within twenty-five centimeters of the anal margin can be easily visualized by the proctoscope. Roentgenoscopic visualization should always be preceded by proctoscopy for this reason.

Malignancies of the colon and rectum are most frequently attacked by irradiation, surgical diathermy (fulguration), or surgery; or the lesion may be treated by combinations of these methods.

RADIUM

Radium application is generally limited to the portion of the bowel easily visualzed by proctoscopy, i. e., below the rectosigmoid. Cancer of the rectum has been cured in an occasional case by radium, while it has had little effect in other cases. The value of radium therapy alone is compromised by our inability to determine in advance which cancer is radiosensitive. Radium is usually given by one of three methods. First, radium may be used alone if an adequate distribution of application is obtained. This type of treatment is rarely used, being most frequently utilized in patients refusing surgery or in which surgery is contraindicated. Secondly, radium may be applied preoperatively in hope of avoiding surgery or in an effort to obtain some reduction in the activity and fixation of the growth. The full benefit of radium is not manifest for eight to twelve weeks after application and subsequent surgical attack is usually delayed for this period of time. It has been my

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unfortunate experience, however, to see a few small operable growths treated with radium primarily at the patient's request without benefit and finally when consent for surgery was obtained, the growth was fixed and complete removal was impossible. Conversely if a growth is too fixed for resection radium may be applied and occasionally resection is then possible in eight to twelve weeks. Finally, it is in palliative treatment that radium probably is most beneficial. Inoperable and recurrent growths should have at least one good application of radium. There is a definite lessening of the watery mucoid discharge, of blood, and the urgency of stool and pain are greatly relieved. Deep roentgen therapy is of much less value in the treatment of malignancies of the colon and rectum and is rarely indicated.

SURGICAL DIATHERMY

Surgical diathermy is applicable in selected cases of rectal malignancy. Strauss,[2] his associates, and others have been active in this field in recent years. Surgical diathermy is the treatment of choice in the small rectal polyp which is malignant or potentially so. When applied to the usual ulcerated adenocarinoma certain limitations must be observed. Surgical diathermy is not applicable to growths above the rectosigmoid, or peritoneal reflection for fear of perforation into the general peritoneal cavity. Low lesions of the posterior wall of the rectum are most ideal for surgical diathermy. Preliminary colostomy is required in approximately fifty per cent. of the cases, and treatments may be repeated every two to three weeks until the desired results are obtained. The mortality approaches that of posterior resection of the rectum by the modified Kraske operation. According to Rankin[3] forty-six per cent. of rectal growths have metastasized to the regional lymph nodes when seen by the surgeon. One serious objection, therefore, to surgical diathermy is that the glands are not removed. However, Kolischer as well as Strauss and his associates express the belief that diathermy arrests further progress and Strauss reports inhibition of the metastasis and states that the cancer cells in the glands removed later look dead. This, of course, is a vital question and must be definitely proved before diathermy is fully accepted. Surgical diathermy is occasionally combined with radium in the treatment of large medullary lesions. Diathermy is used to burn away much of the tumor and then radium is applied. An adequate channel may be thus opened up and much palliation be obtained. Further advances may be expected in the use of surgical diathermy.

SURGERY

The aim of the surgeon operating on colon or rectal malignancies is the removal of the growth and the regional lymph channels and glands, and any local contiguous spread of the growth. The surgeon must have at his command several operative procedures if he is to offer the patient the best chance of cure, conserving at the same time as often as possible the normal rectal sphincter mechanism. When lesions of the rectosigmoid or rectum are present a temporary or permanent colostomy is often necessary and must be accepted by the patient and the surgeon. The colostomy is in most cases willingly accepted by the patient if he is shown a more hopeful prognosis by the use of a radical resection which includes the normal rectal outlet. I have never made use of operations leaving a sacral anus. I feel they are inadequate operations, for the lymph glands draining the site of the lesion are not removed. Control is poor for it is dependent on cicatricial contraction of the outlet. The location of the stoma is unsatisfactory to the patient and adequate care of the stoma by the patient is difficult. If the outlet is placed in the left lower quadrant it is easily cleansed under direct vision of the patient and the care is much simpler. The surgeon can do a great deal to help the patient with a colostomy and it is his duty to instruct the patient regarding his colostomy before releasing him. First the patient is reassured that the care of it is simple, that he cannot do harm by its care, and that he is not a social outcast. A few examples of persons who have had a colostomy for years aid in this mental build up. Then frequently I instruct the patient after he is home and back to his usual routine to take a small enema each morning. This usually takes care of the fecal discharge for the day and later after the routine has been established most of these patients establish regular bowel habits without the enema. Diet likewise is an aid but need not be a restricted diet. A wide belt which is rubber lined

at the colostomy site is to be preferred to a colostomy bag. Under the belt a little cellucotton or similar absorbent is worn, and is usually all that is necessary. The colostomy soon ceases to be a matter of much concern to the patient.

There are certain basic principles in surgery of the colon the experienced surgeon follows in the successful management of these cases. The colon is an infected tube unlike the upper part of the gastrointestinal tract, and the slightest soiling may give rise to serious infection. The blood supply is limited and must be carefully preserved. It is wise to look for pulsation in the small arteries near the divided bowel to insure viability of the bowel. As a rule, if the marginal artery is not sacrificed adequate blood supply is maintained. Primary anastomoses are dangerous, leakage is almost sure to occur and peritonitis frequently follows. Resection of growths with end to end anastomosis has been almost entirely replaced by some type of exteriorization operation.

Operation upon the colon in the presence of obstruction is done at a definitely increased risk, particularly if the attack is made directly upon the obstructing lesion. A preliminary decompression operation is indicated after careful and persistent medical care has failed to relieve the obstruction. Cecostomy or appendicostomy are probably the more commonly used operations of this type but I feel they are definitely inferior to colostomy proximal to the lesion. It is possible by roentgen examination of the gas-filled bowel or by digital rectal examination or palpation to localize the obstruction adequately. A colostomy proximal to the lesion is just as easily and safely done; it may be opened at once by cautery or catheter drainage if necessary and it permits a more complete diversion of the fecal current. I recall a man who had been brought in the hospital with an obstruction of the colon and an emergency cecostomy had been done. This relieved the obstruction but feces continued to fill the descending colon and irrigation through the cecostomy could not remove this mass of feces. It was necessary to do a transverse colostomy before sufficient decompression and cleansing of the bowel could be accomplished to safely permit the removal of an obstructing sigmoid growth.

The preoperative preparation and the postoperative care of these patients have contributed greatly to the improved status of colon surgery at the present time. If the patient is properly rehabilitated and the colon cleansed and decompressed preoperatively the risk of the operation is less and the convalescence easier. The patient enters the hospital forty-eight hours before the operation and is given rectal irrigations of normal saline until the bowel is clean. This procedure is repeated the second morning. A mild cathartic is given on admittance and the following morning. The night before operation and the morning of the operation the patient is given paregoric and the bowel is aspirated. A high caloric, high carbohydrate, non-residue diet is allowed. If the patient has an obstruction much relief can be obtained by warm rectal irrigations, hot abdominal stupes, intraduodenal suction and intravenous fluids. Rarely is it not possible to markedly improve the patient with an obstructing colon lesion before operation. It is my custom to withhold fluids by mouth post-operatively until evidence of peristaltic activity is present. Distension, which is certainly to be avoided in colon surgery is thus reduced to a minimum.

Intraperitoneal vaccination preoperatively undoubtedly has had a great deal to do with reducing the incidence of peritonitis. It is composed of killed bacillus coli and streptococci and is injected intraperitoneally forty-eight to sixty hours before operation. The cell count of the peritoneal exudate is increased ten times or more. At first the exudate is composed of neutrophiles; after forty-eight hours histiocytes replace the neutrophiles. The effect is for the most part a non-specific phagocytosis. The bacterial vaccine is preferred to other substances for it also tends to arouse a certain amount of true antibody immunity. This vaccine, however, is specific to just the bacteria used and to just the particular strain of that bacteria, so that the non-specific phagocytic effect is the more important. It is also well known clinically, that any intra-abdominal procedure that opens or divides the bowel contaminates the peritoneum; a true aseptic anastomosis or resection does not exist. And it is well that it does not. For the effect of this slight contamination persists long enough to set up a certain immunity against the predominating organisms present in the colon of this particular patient. This immunity is most effec-

tive in the peritoneum where the reaction occurred. Hence, two to three or four weeks later when this immunity has probably reached its height, a more radical procedure even with considerable soiling can be carried out more safely than if it were done as a primary procedure. That such general and local immunity exists is shown nicely by the primary healing which usually follows the closure of a colostomy in a definitely infected field.

This discussion then leads naturally to the question of single or multiple stage procedures. The exteriorization type of operation following the Mikulicz principle, now so universally applied to suitable lesions, is always done in two or more stages. However, in the rectal or rectosigmoid lesion or lesions in the right half of the colon, opinion is quite divided as to whether these lesions are best resected in one or two stages. Certain lesions are resected in two stages by necessity, namely: those lesions which are fixed, perforated, obstructed, or lesions in debilitated patients. Likewise occasionally a lesion is resected in one stage by necessity. There exists, however, a great number of cases in which the decision is made electively by the surgeon. The ideal is to do that operation which will most quickly restore the patient to health at the least risk to his life. It is generally held, I believe, that one-stage procedures are advised because the patient is young, robust, the growth is small, or the surgeon is so adept that the procedure may be carried out rapidly with little shock. Surely to do a one-stage procedure these criteria should be fulfilled, but I believe a very basic point is being overlooked in this reasoning. That is the question of peritoneal protection. A preliminary division of the bowel and establishment of a colostomy, or the establishment primarily of an ileocolostomy contaminates the peritoneum enough to set up the immunity mentioned before, so that the resection, the really serious part in the cure of the patient, is done with less reaction and a lowered mortality. To compare statistics is difficult in one surgeon's practice for he has done probably all the difficult cases in two stages and the easier cases in one stage, but I believe that had his easier cases been subjected to a two-stage procedure the mortality among these cases would have been considerably lower. In addition I feel sure that wound infections, ileus, and debilitating postoperative reactions are more common following one-stage procedures. For these reasons, the period of time from the initial operation until return of health is no longer and the actual hospitalization frequently is no longer if two-stage procedures are employed in preference to one-stage procedures. Each case must be handled individually but I believe that if multiple-stage procedures are favored, conservation of life, time and money will be better effected.

There exists numerous operative procedures for the choice of the colon surgeon. The situation of the growth, the presence or absence of fixation or metastasis, and the age of the patient helps the surgeon to select the most ideal procedure for the particular patient. Lesions located between the hepatic flexure and the lower sigmoid are best handled by exteriorization, removing the growth at once at the level of the skin by the use of a three-bladed clamp or packing away the skin and removing the bowel flush with the fascia in ten days. The latter procedure permits the removal of more bowel and mesentery. Then the spur is removed by a necrosing clamp and the colostomy is closed at a later date. Lesions in the right half of the colon are best handled by a preliminary ileocolostomy to the transverse colon followed at a later date by a resection of the right half of the colon. If the growth is fixed or perforated an end to side anastomosis will permit a subsidence of the associated infection and facilitate resection. The sealing off principle of Pemberton[4] reduces contamination of the general peritoneal cavity to a minimum and permits a greater limit of operability. Lesions just above the rectosigmoid, at the rectosigmoid, or involving the upper rectum, may be resected by one of several procedures. Here the surgeon must exercise fine judgment to select the procedure which will give the best chance of cure at the least risk and at the same time preserve the rectal sphincter if possible. If the patient is thin and the growth lies at least two inches above the peritoneal reflexion it may be exteriorized by division of the peritoneal reflexion and straightening out the sacral curve of the rectum. This is, of course, safer than any intra-abdominal anastomosis. If exteriorization is not feasible then after a preliminary left loin or transverse colostomy the lower sigmoid and rectosigmoid may be freed up, the lesion excised widely, taking much of the sig-

moid mesenteric gland bearing tissue and anastomosing end to end the bowel over a tube as in the Balfour type of operation or as described by Dixon,[5] bringing the anastomotic line below the peritoneum. The colostomy is then closed at a later date. Dixon has applied this procedure to lesions involving the rectosigmoid and upper rectum in preference to the combined abdominoperineal resection. The combined operation is the most radical. After a preliminary single-barrel colostomy the remaining sigmoid, rectosigmoid and rectum are freed from their attachments, a new peritoneal floor reconstructed and the bowel removed through the perineum, sacrificing the anal sphincter and leaving a permanent colostomy. The lymphatic drainage of the upper rectum and rectosigmoid is proximal, hence the operations of local segmental resection are justifiable and have a definite place in the surgery of the rectosigmoid and upper rectum; but I feel local recurrences are definitely more frequent after the local resections than after the combined abdominoperineal resection. Lower rectal growths are best handled by a preliminary permanent colostomy followed by a resection of the rectum employing a modified Kraske type of operation. A few lesions limited to the mucosa are amenable to local excision followed by radium.

Finally even in the presence of a metastatic nodule in the liver, resection if easily accomplished, is often advisable, for life is made more comfortable, and death from metastasis is less painful than from a bleeding, ulcerating, penetrating, local lesion.

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DISCUSSION

Dr. Bernard Portis, Chicago: I would just like to discuss the question of electrocoagulation in carcinoma of the rectum. It happens that at the hospital with which I am associated most of the work is being done in Chicago. Back in 1921 I used electrocoagulation in experimental work. That was followed shortly after by the application of electrocoagulation to these growths in the rectum. There is considerable divergence of opinion in our own hospital as to applicability of this procedure. I personally feel it has a definite use but very sharply demarcated in contradistinction to Dr. Strauss who uses it in most cases of carcinoma of the rectum. I have seen at postmorten hemorrhages and perforation after its use. I think it is definitely limited to tumors below the peritoneal reflexion and on the posterior wall. If any case is operable it should be operated on even though it is in a position that may be treated by electracoagulation. Sometimes it is not necessary to do a colostomy in a growth in the anal canal, as we can destroy the growth and have a satisfactory anal canal. If the lesion is below the peritoneal reflexion in a patient who cannot stand radical surgery, such as diabetics, cardiacs and those with coronary lesions, electrocoagulation has helped. It has helped a great deal in the treatment of inoperable carcinoma of the rectum. I believe indiscriminate use of this method has put back the progress of rectal surgery to a considerable degree because many patients who are operable are treated by electrocoagulation and then go on to the inoperable stage with gland involvement.

Dr. Lorin D. Whittaker, Peoria (closing): I appreciate the discussion which brought out a little more in detail the feeling I have with regard to electrocoagulation. Surgery is without doubt the treatment of choice but to be most successful it must be done early. Malignancy must be excluded in any patient complaining of rectal bleeding, even in the presence of hemorrhoids, or in patients presenting changes in bowel habit, or presenting the picture of an unexplained anemia. This is done by digital rectal examination, protoscopy and roentgenoscopy. If we keep alert to the possibilities of colon malignancy and investigate our suspected cases early, we can bring the patients to early surgical relief with improved prognosis. The treatment must be individualized.

LAROSTIDIN IN THE TREATMENT OF PEPTIC ULCER

New importance is placed upon the Larostidin treatment for peptic ulcer by a report appearing as the lead article in the November issue of Military Surgeon. Based on the author's experiences with the therapy over a period of more than three years in a group of 132 cases, the article shows Larostidin the therapy of choice in gastro-intestinal ulcers, even some that were complicated by serious other diseases, and reveals important economic advantages to this method of treatment. According to Mitchell M. Benedict, B. S., M. D., the author, use of this treatment resulted in slashing average hospitalization time for peptic ulcer patients from 90 to 30 days.

Included in his group of 132 cases were 10 cases of tuberculous enterocolitis.

In a quite detailed preamble Dr. Benedict summarizes the previously published conclusions of other investigators with regard to the Larostidin treatment. As a check upon the theories held by some that response to Larostidin might be due mainly to bene-

ficial psychological impressions, Benedict hit upon the naive plan of giving injections of normal saline solutions to 10 patients who thought they were getting injections of Larostidin. Nine other patients actually getting Larostidin were used as controls. The former group showed no response to the saline injections, "continued to have pain, food intolerance, impaired appetite, and to lose weight." Then, following the tenth injection, these 10 patients were switched, again without their knowing it, to Larostidin and, again quoting the author, "from the time of eleventh injection they showed the usual progress and improvement."

Discharged patients were followed by letter and there were periodic checks to determine recurrence of symptoms. Undoubtedly one of the most interesting findings was that, in these cases of recurrence, x-ray determinations revealed the development of a new ulcer rather than a breakdown of the original lesion. Where recurrence occurred patients were given a repeat treatment of Larostidin with satisfactory improvement in every instance.

Predisposition toward ulcer formation continues, the effect of Larostidin being upon the lesion itself rather than constitutional make-up, observes the author, who nevertheless believes that Larostidin may conceivably be more effective in altering the constitutional predisposition than is now conceded.

Case records of four patients are reviewed in detail. One male patient had a history of sharp pain in the epigastrium and vomiting 10 minutes after each meal over a period of 12 years, another 37 year old male patient a 14 year history of stomach trouble, including an operation for perforated ulcer 13 years back. A third case described was evidently a particularly hard test for Larostidin, exhibiting a two year history of severe gastric pain and hemorrhage, the pain of such intensity that the patient was taking 2½ grains morphine per day; there had been hemorrhage only two weeks prior to the reported hospitalization. Every one of these patients was discharged symptom free after undergoing treatment with Larostidin.

The Larostidin treatment consists of deep intramuscular injections, every day for a period of usually 24 days, of 5 cc of the preparation (a 4% isotonic solution of 1-histidine-monohydrochloride).

MASSIVE DOSES OF VITAMIN "D" OF NO VALUE IN ARTHRITIS

Drs. Nathan R. Abrams and Walter Bauer of the Massachusetts General Hospital in a recent issue of the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION said: Administration of massive doses of vitamin D, averaging between 150,000 and 200,000 U. S. P. units daily, is of little or no value in altering of the course of rheumatoid arthritis.

If the occasional beneficial results of vitamin D are to be ascribed to some impurity contained in the preparations employed, such impurity had best be isolated and tested separately, these physicians advised.

Massive vitamin D therapy for arthritis was first suggested in 1935 by Dreyer and Reed, and although several papers on the same subject have appeared since that time, the evidence presented has been conflicting. Up to the present time, the Council on Pharmacy and Chemistry of the A.M.A. has not accepted any exceptionally high potency vitamin preparations for the specific treatment of arthritis.

Working with Winthrop's Drisdol, Abrams and Bauer found that toxic manifestations were observed when their patients received 200,000 U. S. P. units of the crystalline vitamin D in propylene glycol, or 300,000 U. S. P. units daily in sesame oil. Many of the patients also showed evidence of hypercalcemia, or excess concentration of calcium, at these dosage levels.

The possibility that propylene glycol might be responsible for the toxicity was eliminated by experiments in which the glycol was administered in milk to five patients in doses the same as or larger than they had received when taking the propylene glycol containing vitamin D. In no case instance were any symptoms experienced.

These results again emphasize the fact that propylent glycol appears to have quite a different reaction on the body than ethylene glycol or its derivatives.

Of 18 patients observed, eight showed subjective improvement throughout the period of therapy the doctors report, but in only three instances was this accompanied by objective improvement, and in only one was it marked.

MEDICAL CARE PLAN ABANDONED IN WASHINGTON

We have been informed through a communication from Dr. Clarence A. Smith, editor of *Northwest Medicine*, that the plan described in the October 15 issue of THE JOURNAL, page 1475, on "Care for Social Security Clients in the State of Washington," "was abandoned in the spring of 1938 due to suspension of federal contributions and lack of state funds." Because of this lack of funds, care of the indigent has now been returned to the individual counties, and there is no longer any uniform plan of supplying medical service for the indigent, and the greater part of such service is rendered without pay by physicians.

THE TYRANNY OF ABBREVIATIONS

When abbreviations are used in medical papers, in the recording of case histories or physical examinations or in operative or pathologic reports, the meaning should be entirely clear to all who may have occasion to read them. This is not, of course, the case. Abbreviations of medical terms are used obviously to save the time of the writer; too often, however, the time thus saved is wasted many times over by the person who is trying to decipher the meaning originally intended. When placed within a context, many of the abbreviations commonly employed in medicine are reasonably clear to those intimately familiar with the particular field; but when removed from such environment they become even more abstruse. Few readers for example can probably identify with ease such fairly commonly employed abbreviations as M. T. R., PcB., P. P. D., M. E. D., s. e. d., M. K. R. or K. P. Even when the abbreviations are placed in the proper set-

ting many medical men would have difficulty in translating PcB., into "near point of convergence," M. T. R. into "Meinicke flocculation reaction" or M. E. D. into "minimal erythema dose."

Although for the uninitiated the ophthalmologists possess probably the worst collection of uninterpretable abbreviations, such as K. P. for "keratitis punctata," Hm for "hyperopia manifest," O. U. for "oculus uterque (both eyes)," M. A. for "meter angle" and so on almost ad infinitum, those in other fields are by no means free of criticism. The average physician would usually interpret P. S. P. as the "phenolsulfonphthalein test," M. L. D. as "minimal lethal dose" and possibly P. P. D. as "purified protein derivative," but others who also may need to translate such initials, including manuscript editors, social service workers and statisticians, may have serious difficulties. Sometimes the attempt at interpretation gives rise to persistent errors of more or less serious nature, such as the reasonable interpretation of E. coli as "Endamoeba coli" when it should have been "Escherichia coli."

Hours sometimes have been spent in attempting to decode the meaning of such abbreviations. The use of such short cuts to expression may be an indication of unnecessary haste, careless recording of notes, or slipshod methods of experimentation and study. Reports are written for the reader, not the author, and the reader should not have to be an expert in crytography to find out what it is all about.—*Jour. A. M. A.*, Sept. 17, 1938.

ALCOHOL IN RELATION TO TRAFFIC ACCIDENTS

Richard L. Holcomb, Evanston, Ill. (Journal A. M. A., Sept. 17, 1938), reports the results of a study of the drinking of drivers involved in personal injury accidents and of the drinking of drivers in the general population. The second study served as a control of the first, allowing conclusions to be drawn as to the part alcohol plays in accidents. A total of 270 persons were tested in the first study. Drivers involved in personal injury accidents who accompanied the persons injured to a hospital or drivers who themselves were injured were tested by urinalysis for alcohol. A total of 1,750 persons were tested in the second study. Drivers were chosen at random from an area comparable to that of the first study. A complete testing laboratory, with the Harger "drunkometer,' was set up in a trailer, allowing breath tests for alcohol to be made immediately. 1. The highest percentage of drinking drivers occurs in the early morning hours and over the week-end. 2. The largest number of drinking drivers occurs in the early evening and over the week-end. 3. The peak age for drinking drivers is from 25 to 30. 4. Women drink and drive as much as men when the number of women driving at various hours of the day is considered. 5. The percentage of drinking drivers in the general population varies as does the percentage of drinking drivers in the personal injury accident group but falls considerably lower at all times. 6. The percentage or number of drivers involved in personal injury accidents varies as does the percentage or number of drinking drivers. 7. As the blood alcohol content increases, the number of drivers appearing in the personal injury accident group increases out of all proportion over that in the general driving population. 8. As alcohol increases, accidents increase and at a rate somewhat proportionate to the increase in alcohol. 9. Equal percentages of drinking drivers are found in the accident group and in the general population group at a point near 0.5 part of alcohol per thousand parts of blood, indicating that alcohol in that amount is not necessarily a significant cause of accidents. 10. The data gathered in this study confirms a self-evident fact, that alcohol is a major cause of automobile accidents.

THE PATHOLOGY OF BERIBERI

E. B. Vedder, Washington, D. C. (Journal A. M. A., March 19, 1938), states that the pathology of beriberi may be discussed under three heads: cardiac pathology, degenerative changes in the nervous system and anasarca. While much has been learned concerning the etiology of beriberi from animal experimentation, one should distinguish between the pathology of human beriberi and that of birds and animals. Knowledge of human pathology is more limited than it should be after so many years of study, but it is significant. Death does not appear to be caused by neuritis, however extensive it may be, but by cardiac hypertrophy followed by sudden dilatation and cardiac failure. The cause of the hypertrophy and dilatation of the right side of the heart is not known. Cardiac hypertrophy is much more frequent in the "wet" than in the "dry" forms of beriberi. Unfortunately this explanation does not account for the peculiar selection of the right side of the heart for this action. If the hypertrophy is caused simply by the imbibition of fluid by the muscle fibers, this could be shown by comparing the weight of this dried heart muscle with the dried weight of normal hearts. This has not been done for human cases. Until such observations are made on the enlarged hearts in cases in man, the question cannot be regarded as settled; but the fact is that at present one is still at a loss to account for the concomitant right sided hypertrophy and weakness in beriberi.

It is estimated that 10% of people in this country suffer from some kind of allergy; that is, are hypersensitive to some food or other substance.

In a recent survey at American colleges, it was reported that one student in every four is handicapped by serious eye defects.

Marriages

CLARK E. BAKER, Marion, Ill., to Miss Mary Rodd of St. Louis, September 10.

HERBERT PAUL DEXHEIMER, O'Fallon, Ill., to Miss Doris McGilligan at Tower Hill, October 29.

JOHN RICHARD HEATON, Hoopeston, Ill., to Miss Edyth Eleanor Clawson of La Fayette, Ind., October 29.

HENRY SARGENT HOWARD to Miss Louise Flora, both of Peoria, Ill., October 20.

THOMAS PAINE SALTIEL, Chicago, to Miss Gene Sternberg of New York, November 14.

Personals

Dr. John R. Neal of Springfield, Ill., has been appointed Dean of the Cook County Graduate School of Medicine. This was announced by the Board of Trustees following their annual meeting in December.

Dr. Lloyd Arnold has been appointed secretary and Dr. G. Howard Gowen chief medical officer of Chicago Board of Health.

Dr. Harry Oberhelman was invited to address the Scott County Medical Society of Iowa at Davenport December 6 on "Some Surgical Problems."

Drs. Clifford Grulee and Philip Schneider gave a program on "Infant Feeding" and "Toxemias of Pregnancy" before the Carroll-Jo Daviess County Medical Societies, December 7.

Dr. Herman L. Kretschmer read a paper at the meeting of the Southeastern Branch of the American Urological Association, Louisville, Kentucky, on December 2. His subject was "Elusive Ulcer of the Badder."

Dr. Julius L. Spivack addressed the Milwaukee Society of Clinical Surgery, Milwaukee, Wisconsin, November 23 on "Some Points in the Technique of Appendectomy."

Dr. Maurice L. Blatt spoke before the Vermilion County Medical Society at Danville, Illinois, December 6, on "Rabies."

Dr. George L. Apfelbach gave a paper to the Tri-County Medical Society at Racine, Wisconsin, on November 30, 1938, on "Diagnosis of the Lesions of the Lower Back."

Dr. James H. Hutton was invited to present a program on "Some Common Endicrinopathies, Their Diagnosis and Treatment" before the Lee County Medical Society at Dixon, December 15.

Dr. Guy V. Pontius was invited to give a paper on "Diagnosis and Treatment of Diseases of the Colon and Rectum" before the Bureau County Medical Society at Spring Valley, December 13.

Dr. George F. O'Brien gave a program on "Pneumonia" for the Fulton County Medical Society at Canton December 13.

Dr. Clement L. Martin presented a paper on "Treatment of Hemorrhoids" before the Will-Grundy County Medical Society at Joliet, December 14.

Dr. Jerome R. Head was invited to give a paper on "Pulmonary Disease" before the Coles-Cumberland County Medical Society at Mattoon, December 14.

Dr. Norbert C. Barwasser, Moline, discussed the management of common skin diseases before the Whiteside County Medical Society, Sterling, November 21.

Dr. Edmund F. Foley, Chicago, discussed "Jaundice: Its Clinical Significance" before the Adams County Medical Society in Quincy November 14.

Dr. Francis L. Lederer, Chicago, addressed the Rock Island County Medical Society in Moline November 8 on "Throat Complications of Interest to the General Practitioner."

The Peoria City Medical Society was addressed November 1 by Lewis Gerber, Ph.D., on "Recent Advances in Clinical Chemistry" and Dr. Hugh E. Cooper on "Fractures of the Shaft of the Femur."

Dr. Fred W. Bailey, St. Louis, discussed "Nonpenetrating Intra-Abdominal Injuries" before the Madison County Medical Society in Alton November 4.

A symposium on intestinal obstruction was presented before the Sangamon County Medical Society, Springfield, November 3 by Drs. Richard F. Herndon, Thomas D. Masters, David J. Lewis and Charles L. Patton, all of Springfield.

Dr. Fred M. Drennan, Chicago, discussed "Diagnosis and Treatment of Irritable Colon" before the Will-Grundy County Medical Society in Joliet October 18. Dr. Jacob P. Greenhill, Chicago, addressed the society November 3 on "Diagnosis and Treatment of Obstetric Hemorrhages."

The Chicago Orthopaedic Society was addressed November 11 by Drs. Walter R. Fischer on "Fracture of the Scapula Requiring Open Reduction" (report of a case) and Wallace H. Cole, St. Paul, "Clinical Observations on the Physiology of Bone."

Dr. Howard C. Taylor, Jr., New York, discussed "Relationship of Hormones to the Toxe-

mias of Pregnancy" before the Chicago Gynecological Society November 18.

The Chicago Ophthalmological Society was addressed October 24 by Drs. Samuel G. Higgins, Milwaukee, on "Ophthalmic Surgery in India" and William A. Fisher, "Senile Cataract: The Usual Method of Operating in India." Dr. Robert von der Heydt showed photographs in color of diseases of the eye.

The Chicago Society of Internal Medicine was addressed December 19, among others, by Dr. Louis R. Limarzi and Emil M. Schleicher on "The Reaction of Peripheral Blood and Bone Marrow in Chronic Hemorrhage and in Essential Thrombocytopenic Purpura," and Dr. Carl C. Pfeiffer, "Effect of Analeptic Drugs in Hibernating Ground Squirrels."

Dr. Gilbert J. Thomas, clinical associate professor of urology, University of Minnesota Medical School, Minneapolis, discussed "Tuberculosis of the Urological Tract" before the Chicago Medical and Urological societies at a joint meeting December 7 at the Chicago Woman's Club.

Dr. Paul R. Cannon, professor of pathology, University of Chicago, has been appointed a member of the Medical Fellowship Board of the National Research Council, for the period ending June 30, 1941, to complete the unexpired term of Dr. Eugene L. Opie, New York, who resigned.

At a meeting of the Chicago Neurological Society October 20 the speakers were Drs. Foster Kennedy, New York, on "The Organic Background of Mind"; Victor E. Gonda, "War Neuroses," and Paul C. Bucy, "Tremor: A Consideration of Its Physiology and Abolition by Surgical Means."

Dr. Frederick A. Coller, Ann Arbor, Mich., discussed "Hypochloremia Associated with Surgical Diseases" before the Chicago Surgical Society November 4; Drs. Loyal Davis and John Martin, "Surgical Aspects of Paratrigeminal Lesions," and Geza DeTakats, "Observations of Congenital Megacolon."

The Chicago Laryngological and Otological Society was addressed November 7 by Drs. Ellison L. Ross on "Experiences with a Vital Stain in Otolaryngeal Tissues"; Frank E. Simpson, "Intrinsic Carcinoma of the Larynx—A New Instrument Modeled After the Jackson Bronchoscope for the Intralaryngeal Application of Radon," and Hans Brunner, "Inflammatory Diseases of Meninges and Brain of Pharyngeal Origin."

Dr. Robert A. Black, professor of pediatrics, Loyola University School of Medicine, has been appointed president of the Chicago board of health. The appointment is temporary during the absence of Dr. Herman N. Bundesen, who has been granted leave of absence pending the outcome of the government's antitrust action against the milk industry, newspapers reported. Dr. Black has been a member of the board of health since 1935; he also is founder and superintendent of the La Rabida sanatorium in Jackson Park for children with heart disease.

News Notes

—The cornerstone of the new building for St. John's Hospital was laid in Springfield October 16. The new unit will be twelve stories high with accommodations for 620 patients.

—A group of introductory lectures on psychoanalysis began at the University of Illinois College of Medicine November 30 under the auspices of the Institute for Psychoanalysis. Dr. Franz Alexander, director of the institute, is making a systematic presentation of medical psychoanalysis. Sixteen weekly lectures make up the course, which carries a fee of $10.

—A quarantine was placed against the Veterans' Administration Facility in Hines November 27, closing it to visitors following an outbreak of four cases and one death from diphtheria, according to the Chicago *Tribune*. At the time of this report fourteen patients had infectious sore throats. It was stated that six diphtheria carriers were disclosed in the tests that were given to 1,200 staff members and 1,800 patients. The quarantine will be continued until danger of an epidemic is over.

—New buildings at Anna State Hospital, erected during the past five years at a cost of $1,275,121, were dedicated October 15. Mr. A. L. Bowen, director of the state department of public welfare, gave the dedicatory address. The recreation hall in which the ceremonies took place was named in honor of the late Dr. Ralph A. Goodner; other buildings have been named for Drs. W. C. Lence and William L. Athon, former managing officers of the institution. A portrait of Dr. Goodner was unveiled. Funds for remodeling and new buildings were supplied

through state appropriation and PWA grants. The Athon and Lence cottages are of the one story "E-type" construction which is standard for state mental hospitals and contain 120 beds each. A 132 bed diagnostic center and hospital is now nearing completion.

—The Educational Committee scheduled doctors to address 21 lay groups during the month of December. These included 8 programs on socialized medicine. The Committee arranged 23 scientific programs for county medical societies in the state during December. Seventeen of these programs were given by members of the Chicago Medical Society. The Committee has been invited to have an exhibit of its work at the Midwinter Meeting of the Chicago Dental Society at the Stevens Hotel in February.

—The Department of Medicine of the University of Chicago is continuing its clinical studies of lobar pneumonia. For this purpose a certain number of beds are set aside in the Albert Merritt Billings Hospital of the University Clinics to which patients may be admitted free of all charge in case their financial circumstances warrant such consideration. For the admission of patients with lobar pneumonia, or for further information, please telephone Midway 0800 and ask for Dr. Gray, the Resident Physician.

—Thursday, January 5, is designated as Medical and Hospital Day at the Medinah Shrine Circus, Union Stock Yards Amphitheatre. All proceeds from the circus are to be used for the maintenance of the Shriners' Hospital for Crippled Children.

Deaths

James Roy Bierly, Peoria, Ill.; Chicago College of Medicine and Surgery, 1911; a Fellow, A. M. A.; served during the World War; aged 55; on the staff of the Proctor Hospital, where he died, October 18.

Alois J. Blickhan, Quincy, Ill.; Keokuk (Iowa) Medical College, 1891; member of the Illinois State Medical Society; aged 74; died, October 20, of arteriosclerosis and hypostatic pneumonia.

Ward Greene Clarke, Chicago; Rush Medical College, Chicago, 1882; aged 79; died, October 27, of coronary and cerebral thrombosis.

Chester C. Copelan, Springfield, Ill.; Chicago College of Medicine and Surgery, 1915; a Fellow, A. M. A.; served during the World War; aged 47; on the staff of St. John's Hospital, where he died, October 9, of splenic myelogenous leukemia.

Frank T. Duffy, Chicago, Ill.; Loyola University Medical College, 1914; a Fellow, A. M. A.; 1st Lt., 79th Division, U. S. Army, during World War. Went into action and upon returning to this country was commissioned in the U. S. Veterans' Administration and has held various high ranking positions up to the time of his death, November 17, 1938, in the Veterans Administration Facility, Los Angeles, California. Cause of death, coronary thrombosis; age 48. Since the close of the World War Dr. Duffy has been active in military circles attaining the rank of Major in the National Guard. He has been particularly active, and has done commendable work, in the ex-service men's organizations. He was a member of the Masonic order; American Legion; La Societé des 40 Hommes et 8 Chevaux; Veterans of Foreign Wars; and the Military Order of the Purple Heart. In 1919 Dr. Duffy completed post-graduate courses at the Belleview Hospital and Cornell University. He was a member of the Illinois Medical Society; and Association of Military Surgeons.

Arthur Horace Gordon, Chicago; Hahnemann Medical College and Hospital, Chicago, 1887; a Fellow, A. M. A.; at one time professor of internal medicine at his alma mater; on the staffs of the Edgewater and Illinois Masonic hospitals; aged 75; died, December 2, of coronary thrombosis.

Aloys Heinen, Chicago; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1904; aged 76; died in September in Germany of chronic myocarditis and arteriosclerosis.

Philip Carl Matthei, Chicago; Rush Medical College, Chicago, 1902; aged 57; died, September 2, in the Augustana Hospital of carcinoma of the rectum and mesenteric thrombosis.

Clifton B. Olds, Chicago; Hahnemann Medical College and Hospital, Chicago, 1905; aged 72; died, October 31, following an operation for perforated ulcer.

William Wheelock Quinlan, Wilmette, Ill.; College of Physicians and Surgeons, Medical Department of Columbia College, New York, 1891; a Fellow, A. M. A.; medical referee of the Mutual Life Insurance Company; aged 71; died, September 24, of heart disease.

Ira T. Roberts, Johnston City, Ill.; St. Louis College of Physicians and Surgeons, 1902; aged 59; died, October 26, in St. Andrew's Hospital Murphysboro, of cerebral hemorrhage.

James Henry Roth, Chicago; Rush Medical College, Chicago, 1895; aged 70; died, October 1, of cerebral hemorrhage.

William Henry Schwingel, Aurora, Ill.; School of Pharmacy of the University of Iowa, 1893; Rush Medical College, 1905; a Fellow, American College of Surgeons; member of Illinois State Medical Society; served on staffs of Copley, St. Charles and St. Joseph Hospitals; aged 68; died November 7, result of injuries received in automobile accident.

Hannah Steele Sparrow, Chicago; Bennett College of Eclectic Medicine and Surgery, Chicago, 1887; aged 84; died, September 30.